ILLUSTRATED
ELECTRICAL REVIEW
A Journal of Scientific and Electrical Progress.

VOL. 29. No. 19. WEEKLY. | NEW YORK, WEDNESDAY, NOVEMBER 4, 1896. | $3 PER ANNUM. Single Copies, 10 Cents.

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VIEWS, NEWS AND INTERVIEWS.

The ethics of the street car and elevated train is always interesting, remarks the New York *Evening Sun*. The problems presented in the course of travel in public conveyances are always with us. Here is another case where the question, Shall a man sit or resign his seat? was complicated with another. An individual offered his place to a woman. "Indeed no," was the curt reply. "This so-called politeness on the part of mankind is only the gilding of our chains. Men are polite because they think women inferior to them. If they looked upon us as their equals these stupid gallantries would cease." Is it any wonder that the average man is a little doubtful about the amiability of the new woman?

In the effete East we are apt to forget, through constant familiarity, the advantages which we enjoy in all kinds of rapid communication, and are especially prone to lose sight of the great advantages afforded to us by our excellent telephone and telegraph service. In the far West, means of communication are almost primeval in some respects. For instance, in the interior of Wyoming there is a military post called Fort Washakie, which is located in a fertile basin of the Wind River Valley, 148 miles from the nearest railroad point. The only means of covering this distance is by traveling on an antediluvian mail coach or on horseback. The nearest telegraph office is Lander, Wyoming, which is 16 miles from Fort Washakie. Messages from the Fort are transmitted over the telephone line to the telegraph office in Lander, received by word of mouth, then telegraphed to Rawlins, Wyoming, the nearest railroad point, 132 miles from Lander. The government for some time maintained this combined telephone and telegraph line, which is built partly on wooden poles and partly on iron poles, but finally disposed of it to private parties for $5, and the agreement to maintain the line in repair and to transmit government messages free. In many places the telegraph line follows the road and often crosses it. Heavy freight teams, composed of trains of three or four wagons connected with a heavy log chain and drawn by often as many as 24 horses and mules, are constantly passing over the road. These wagons frequently break down, and usually the telegraph wire is the handiest thing to make repairs with. In such cases the freighters do not hesitate to tear down the line, use what wire they need and pass on. In the Winter the storms are very severe, often blowing down considerable sections of the line. A telegram sent from Fort Washakie in the morning of one day will reach New York probably the following night. Even with this style of communication it is astonishing how well informed people in the vicinity of Fort Washakie are regarding the current events of the day.

The New York *Tribune* is authority for the statement that Mr. W. C. Whitney and Mr. J. D. Crimmins disagree radically in regard to the use of motive power on Metropolitan Traction. Mr. Whitney is said to want to use compressed air, while Mr. Crimmins is emphatically in favor of electricity. Mr. Crimmins holds that the electric system in Lenox avenue has demonstrated its success and its superiority to either the cable or compressed air. Mr. Whitney is alleged, however, to have determined on compressed air, and it is claimed that a contract has been made with the Wheelock Air-Power Company to equip the system.

FIG. 1.—NEW KNIGHT INCLOSED ARC LAMP.

IMPROVEMENT IN ARC LAMPS.

THE DIEHL MANUFACTURING COMPANY HAS BROUGHT OUT THE NEW KNIGHT INCLOSED ARC LAMP.

The field of electric lighting by means of the inclosed arc method has been added to by the perfection of the new Knight lamps, which overcome several features that have thus far been considered as objectionable. This development has been made in the factories of the Diehl Manufacturing Company at Elizabethport, N. J., by the well known arc-lamp expert, Mr. John Knight, and the Diehl Manufacturing Company, which has heretofore been known to the electrical industry as large makers of electric fans and motors, has increased manufacturing facilities with special machinery for a large production of this improved form of inclosed arc lamp.

The illustration, Fig. 1, shows one style of the new inclosed lamp. The feature of the lamp is the method of clamping the globe, which does away with the cumbersome side castings or rods and thereby eliminating the usual shadow, and the construction is such that any ordinary straight lamp chimney, or such as is commonly used with an argand burner, may be substituted in case of breaking, thus relieving the user of the necessity of keeping a supply of especially made globes.

The pair of solenoids are securely fastened top and bottom, which gives the mechanical construction strength and simplicity, and the clutch consists of a tilting washer. Illustration, Fig. 2, shows this lamp with inner globe and reflector. This is adapted for lighting store houses and large areas, and needs only three amperes of current.

Illustrations, Figs. 3 and 4, show the recent types of the series lamps made by the Diehl Manufacturing Company, which have never before been illustrated. These lamps are made with a striking magnet. This auxiliary magnet not only prevents the chattering of the carbons, but

insures the striking of the full arc when the lamp is first turned on. These series lamps consume four to ten amperes at a pressure of 45 volts, and are connected two in series on a 115-volt circuit and four in series on a 230-volt circuit.

American Institute of Electrical Engineers.

The 109th meeting of the Institute was held at 12 West Thirty-first street, Wednesday evening October 21. President Duncan in the chair, and 100 members and guests present.

The meeting was devoted to a topical discussion of "Electric Traction under Steam Railway Conditions." It was opened by Dr. Charles E. Emery. Communications were read from Chas. K. Stearns and Chas. H. Davis. The discussion was then taken up by H. Ward Leonard, Geo. S. Strong, A. E. Kennelly, C. F. Uebelacker, E. E. Ries, Geo. L. Colgate and F. W. Darlington.

It is the intention to discuss the same subject at the Armour Institute, Chicago, October 28.

At a meeting of the Executive Committee, held in the afternoon, the following associate members were elected: Sol. D. Benoliel, 1327 Broadway, residence, 120 West Thirty-fifth street, New York city; Milton L. Fish, assistant manager, Pasadena Electric Light and Power Company, Pasadena, Cal.; Arthur L. Rice, Professor of Steam and Electrical Engineering, Pratt Institute, Brooklyn, N. Y.

The following associate members were transferred to membership: Frank E. Herdman, mechanical and electrical engineer, Crane Elevator Company, Winnetka, Ill.; M. H. Gerry, Jr., superintendent of motive power, the Metropolitan West Side Elevated Railroad Company, Chicago, Ill.; W. S. Hadaway, Jr., electrical heating engineer, 107 Liberty street, New York city.

The International Exposition, Brussels, 1897.

Under the direction of the United States Department of State, Professor J. H. Gore and Thomas Wilson, LL.D., have been appointed commissioners of the United States of America to the International Exposition, to be held at Brussels, Belgium, from May 24 to October 31, 1897. The commissioners have issued a pamphlet containing the rules to be observed by exhibitors of this exposition. The sixth section of the exposition classifies exhibits devoted to lighting, heating, ventilation and applications thereof. The seventh section comprises electricity and traction. All exhibitors desiring to apply for admission to this exposition must obtain special forms supplied by the commission, whose address is Columbian University, Washington, D. C. The application blanks must be filled in and sent not later than January 1, 1897, postage prepaid, and addressed as above.

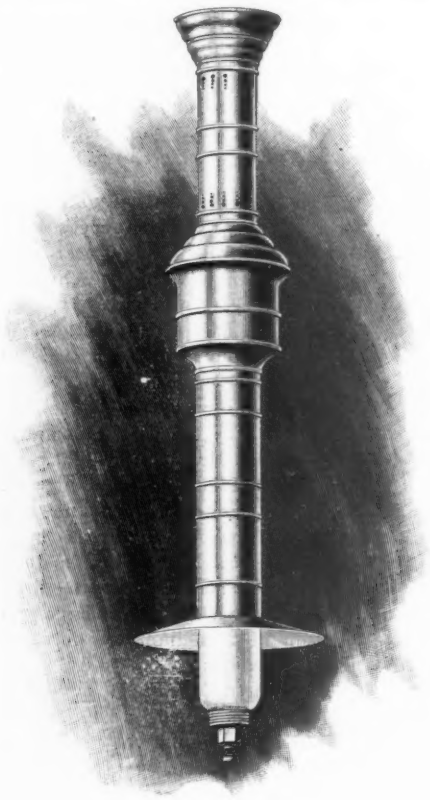

FIG. 2.—KNIGHT ARC LAMP WITH INNER GLOBE AND REFLECTOR.

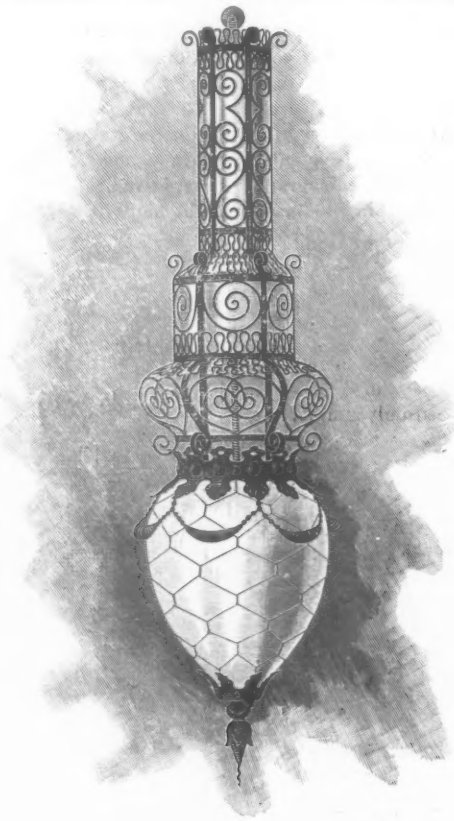

FIG. 3.—KNIGHT ORNAMENTAL SERIES ARC LAMP.

FIG. 4.—KNIGHT SERIES ARC LAMP.

GENERAL NOTES.

Mr. John F. Outwater, representing Hugo Reisinger, the well known carbon man, of New York city, has just returned from a very successful business trip through the West.

The Middletown, Ct., Street Railway Company has elected the following officers: President, John M. Douglas; secretary and treasurer, James K. Guy. The old board of directors was re-elected with one exception, I. H. Kelsey, of Boston, being chosen to succeed Mr. Pond.

The trustees of the village of Portchester, N. Y., announce that they are ready to grant a franchise for an electric railroad, providing a first-class system can be procured. The street railway company has agreed to a clause precluding the use of horse or steam power, and expresses its willingness to adopt any practicable motive power that may be selected by the trustees.

It is reported that Dr. W. Seward Webb proposes to build a new railroad line from White River Junction, Vt., by way of Pompanoosuc River Valley, to Ely, and from there to Barre, via Chelsea. The road is designed to open up the rich copper mines and marble quarries of Vermont. A charter will be asked of the Vermont Legislature this Fall.

The Scranton, Pa., Traction Company will enlarge its motive power at the Providence plant within two months, by the addition of a 700-horse-power engine. Superintendent Robert F. Fox stated that the foundation for the engine bed will be started in a few days. It is to be put in to better accommodate the public, and one of the steps toward making a first-class street-car service in Scranton.

For variety and sustained interest of contents, the November *Scribner's Magazine* is a notable number. The opening article, by Capt. C. J. Melliss of the Ninth Bombay Infantry, "Panther-shooting in Central India," gives not only a vivid impression of the *habitat* of these great cats, but it is also a stirring narrative of adventure in their pursuit, drawn from personal experience. The illustrations by Van Muyden, whose remarkable animal etchings have been praised for their accuracy and truth to nature by the author of the article, will serve to make this brilliant artist of animal life more familiar to American readers.

TELEPHONE NEWS AND COMMENT.

The directors of the New England Telephone and Telegraph Company have declared a regular quarterly dividend of $1.25 per share, payable November 16 to stock of record October 31.

The American Telephone and Telegraph Company, controlling the long-distance service of the country, made its usual arrangements for distributing bulletins giving the returns on election night. As in the past, the company's efficient staff collected news and figures bearing on the result from the most reliable sources. Brief bulletins containing this information were distributed to the main exchanges of the various local companies in all the large cities and towns which are connected with the long-distance service. At the last presidential election, the bulletins issued by the American Telephone and Telegraph Company were among the most reliable sent out. Arrangements were made to transmit these bulletins at frequent intervals to Major McKinley at his home in Canton, Ohio; to Mr. Hobart at his home in Paterson, N. J.; to Senator Quay at his home in Beaver, Pa., and to Republican headquarters in New York and other large cities.

LINDSBORG, KAS.—The Lindsborg Telephone Company has been incorporated, with a capital of $2,000, by W. H. Bishop, D. A. Van Tine, Ira A. Van Tine and John L. Bishop, Salina business men, and Alexander R. Gustafson, of Lindsborg.

The capital stock of the Edison Light and Power Company, of San Francisco, Cal., has been reduced from $3,000,000 to $800,000.

Storage Batteries as Auxiliaries to Electric Railways.

Storage batteries, when applied to electric railways, can be located either in the power house, for regulating purposes, or at the end of long feeders, to supply the variable demand, the feeder capacity being equal to the average load only. The plant here illustrated is situated at the end of a feeder, 11 miles long, on one of the most important lines of the Union Traction Company, of Philadelphia. This year it was decided to extend the line several miles, and it was found that it would be necessary either to build a new power house or install a battery sub-station, as the required addition to the existing feeder system would necessitate such an enormous outlay for copper as to render it commercially impossible.

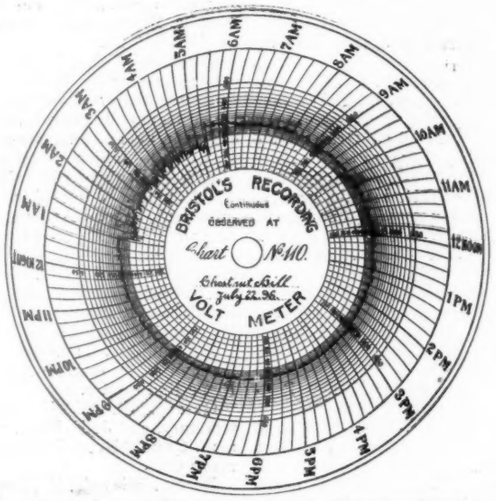

FIG. 1.—STORAGE BATTERIES AS AUXILIARIES TO ELECTRIC RAILWAYS—VOLTMETER CHART.

It was found that the cost of copper alone, to carry out this extension and double the service on the section, would be four or five times the total cost of a battery installation to fully meet all the requirements; and that a new power house was out of the question, on account of the heavy operating expenses. Before the extension was made, the pressure at the end of the feeder was barely enough to operate cars on schedule time, and the pressure varied as much as 50 per cent.

The recording voltmeter chart, Fig. 1, illustrates the effect of the battery as a regulator of pressure. During the four hours between 1 A.M. and 5 A.M., the only time when the battery is taken off the system, the fluctuation in pressure is very marked. The current curve, Fig. 2, which is taken under normal conditions, shows the extent to which the battery regulates; viz., 200 horse-power; but it can be worked up to 800 horse-power in cases of necessity.

The load on the section varies from 100 to 700 amperes; the feeder carries a constant load of 400 amperes, the battery discharging or charging to the extent necessary to maintain this condition. The result in actual practice is found to be that the feeder load remains constant at this average current, and is absolutely independent of the fluctuating demand on the line.

The battery house contains 248 cells. Each cell contains 13 plates, type "G," of the Electric Storage Battery Company's "Chloride Accumulator." The maximum discharge rate of the battery is 400 horse-power for one hour. The plates are contained in lead lined boxes, mounted on two tiers of oil insulators. The connections are made by continuous weld, no mechanical contacts being used throughout the battery. The switchboard consists of three panels, which control the entire operation of the battery, feeder and line. The apparatus is exceedingly simple, consisting only of an ammeter, circuit breaker and knife switch in each of the three circuits, together with voltmeter and recording wattmeters in battery circuit. The Electric Storage Battery Company are at the present time installing several battery plants in street railway power houses.

The battery in these cases enables the generators always to run at full load, and, consequently, at the highest point of efficiency, and to act as a cushion to the engine in the event of the circuit-breaker opening when trouble occurs on the line.

By the use of a properly proportioned battery, the capacity of the generating units employed can be limited to the requirements of the average load only, instead of the maximum, the difference being taken care of by the battery. This usually means a saving of 30 to 40 per cent in the capacity of the units, and, moreover, relieves the machinery from excessive strain, due to sudden fluctuations of load. One of the most valuable functions of the battery is to provide a reserve in case of breakdown, being capable of carrying the total load for a short period. This, in itself, renders the storage battery invaluable to operators of electric railways.

Ohio Electric Light Association.

At the annual meeting of the Ohio Electric Light Association, held recently at Springfield, Ohio, the following officers were elected for the ensuing year: President, John I. Beggs, Cincinnati; vice-president, George S. Long, Bowling Green, and secretary and treasurer, Samuel Scovil, Cleveland. The next meeting of the association will be held at Cincinnati, Ohio, on the second Tuesday in October, 1897.

Electric Railways.

The New London, Ct., Street Railway Company, for year ended September 30, earned gross, $52,661; net, $22,648. After charges and seven per cent dividend, $3,598 was carried to surplus; total surplus now at $27,052.

It is announced on good authority that the West Chicago Street Railroad Company intends to negotiate a consolidated mortgage bond issue with which to take up the $6,000,000 of debenture bonds that have been issued, and to provide for the retirement of $4,000,000 of first mortgage bonds.

The Metropolitan Street Railway Company, of Kansas City, Mo., is constructing a board walk between the tracks of the Elevated railway along the elevated structure of that road. The purpose of the walk is to enable passengers to walk to the nearest station in case the electric power gives out suddenly and causes a temporary stoppage of traffic. The walk will be so constructed that passengers can walk with security.

The Denver, Colo., Consolidated Electric Company has commenced the construction of a new power house on the site of the building destroyed by fire three months ago. The structure will be of brick and fireproof throughout. It will be one-story, 102 by 134 feet, and will cost about $6,000. All the machinery will be in one large department, and the company will otherwise improve its service. Fifty or 60 new dynamos will be added to the company's equipment.

Electric cars from the City Hall in Milwaukee, Wis., to a central point in Racine, 20 miles distant, will be in operation before the close of the present year. The traffic agreement between the Milwaukee Electric Railway and Light Company and the Racine & South Milwaukee Electric Railway Company will go into effect as soon as the two lines are completed, that of the Milwaukee company from Cudahy to South Milwaukee, and the other from Racine to South Milwaukee.

The Hungarian Government has authorized the making of an electric railway between Budapest and Trieste, by the Société de l'Industrie Electrique de Genève, which has deposited caution money of $1,200,000 in the Hungarian treasury. Starting from Budapest, the line is to follow the shore of Lake Balaton, and then pass by Balaton, Fured and Csakathurn, to terminate at Trieste. There are no considerable engineering difficulties to be overcome in this long line.

The Binghamton Railroad Company, Binghamton, New York, has issued statement as of October 1, 1896, showing the earnings and operating expenses of the road for the past five years. The percentage of operating expenses to receipts has been decreased from 60 per cent in 1892 to 56 per cent for the current year. The cost of the road and equipment has been $1,200,850. The capital stock of the road is a little less than $400,000. The net earnings of the road for 1892 were $22,432.11, while the net earnings for 1896 were $59,041.01.

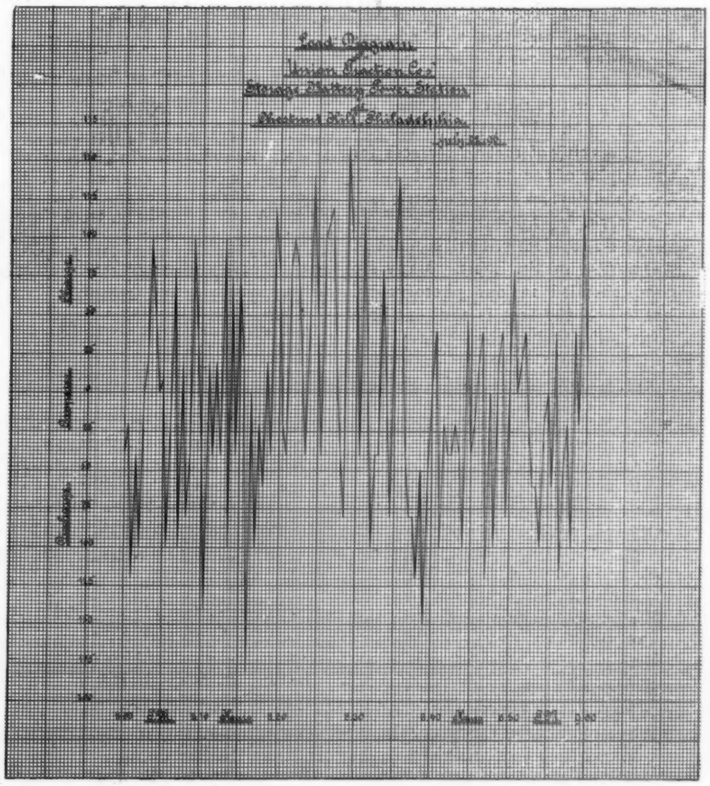

FIG. 2.—STORAGE BATTERIES AS AUXILIARIES TO ELECTRIC RAILWAYS—CURRENT CURVE.

THE GREAT STREET RAILWAY CONVENTION.

St. Louis Justly Proud of the Successful Meeting of the American Street Railway Association.

ECHOES OF THE CONVENTION—ADDITIONAL MENTION OF THE MOST EXTENSIVE EXHIBIT—A RECORD OF THE NAMES OF THE MEMBERS PRESENT—REPRESENTATIVES OF THE MANUFACTURERS IN ATTENDANCE—A GATHERING OF WIDE-AWAKE MEN LONG TO BE REMEMBERED.

The regular proceedings of the convention of the street-railway men of the country at St. Louis was chronicled in the ELECTRICAL REVIEW last week more thoroughly and interestingly than ever before presented in an electrical journal. In this issue we present, in addition to papers, discussion and incidents, two general views of the scene in the exhibition hall, taken from the ELECTRICAL REVIEW headquarters, which will give every reader an excellent idea of the appearance of this very large industrial display. The photographs were taken Thursday afternoon at the time of the convention, and all visitors (excepting, of course, the photographer and the editor !) were enjoying the sights and souvenirs of the famous Anheuser-Busch Brewery some distance away, and this will account for the few persons visible in the pictures. The entire main floor was taken up with exhibits, and they extended up on all four sides of the galleries, making attractive terraces for the display of the many light appliances and devices used in electric railway work.

The sign epidemic, it will be noticed, was abroad in St. Louis. Many are comprehended in our photographs, but one of the best is shut out by a large pillar, being the words "General Electric Company," in artistic script, made of miniature incandescent lamps. A large revolving sign of the Peckham company also attracted notice, as did the beautiful brass and silk banner of the Paige Iron Works—a banner that, slightly changed, had participated in the sound-money parade in Chicago a few days before. "Wm. Wharton, Jr., & Company" was a unique sign made up entirely of the product manufactured by this company.

The interest shown by the street-railway managers in all the various exhibits was constantly noticeable, and must have been very gratifying to the enterprising men who had brought them there at considerable expenditure of time and means. Following are additional descriptions and notes relating to the convention.

MEMBERS OF THE ASSOCIATION PRESENT.

Akron, Ohio—W. D. Chapman, general manager, and C. A. Chapman, Akron Street Railway Co.

Atchison, Kas.—J. A. Bendum, general superintendent, Atchison Railway, Light and Power Co.

Atlanta, Ga.—E. Woodruff, vice-president and general manager, and Thomas Elliott, chief electrician, Atlanta Consolidated Street Railway Co.

Augusta, Ga.—D. B. Dyer, president, and R. J. McCarty, general manager, Augusta Railway Co.

Buffalo, N. Y.—H. H. Littell, vice-president; Robt. E. Fryer, director, and Robt. Dunning, electrical engineer, Buffalo Railway Co. H. H. Littell, vice-president; Burt Van Horn, general manager, and Robt. L. Fryer, director, Buffalo & Niagara Falls Electric Railway Co.

Baltimore, Md.—J. T. Hayward, general manager, and S. B. Thompson, master mechanic, City & Suburban Railway Co. F. E. Tobe, master mechanic, Baltimore City Passenger Railway Co.

Bay City, Mich.—W. B. Morrison, assistant general manager, and A. S. Ashe, superintendent, Bay City Consolidated Railway Co.

Boston, Mass.—C. S. Sargeant, general manager, and J. E. Rugg, general superintendent, West End Street Railway Co.

Bridgeport, Ct.—Andrew Radel, president, Bridgeport Traction Co.

Brockton, Mass.—Chas. S. Clark, director, and A. A. Glasier, clerk, Brockton Street Railway Co.

Brooklyn, N. Y.—John L. Heins, superintendent, Brooklyn City & Newtown Railroad Co. C. L. Rossiter, president, and J. A. McCormack, general superintendent, Brooklyn Heights Railroad Co.

Butte, Mont.—J. R. Wharton, Butte Consolidated Railway Co.

Camden, N. J.—J. Willard Morgan, president; Thos. P. Curley, secretary, and J. Naramore, superintendent, Camden, Gloucester & Woodbury Railway Co. Wm. S. Scull, president, and W. E. Harrington, general manager, Camden Horse Railway Co.

Chicago, Ill.—H. M. Sloan, general manager, Calumet Electric Street Railway Co. F. R. Greene, secretary; T. C. Penington, treasurer; M. K. Bowen, superintendent; G. W. Knox, electrical engineer; J. E. Moore, master mechanic; G. W. Price, A. C. Keidelberg, track foremen; Robt. Stewart; R. L. Garth, passenger agent, and D. Hooton, Chicago City Railway Co. J. B. Wesley, secretary and treasurer, West Chicago Street Railway Co. B. J. Jones, superintendent South Chicago City Railway Co.

Cincinnati, Ohio—H. P. Bradford, general manager, and B. J. Arnold, consulting engineer, Cincinnati Inclined Plane Railway Co. B. L. Kilgour, electrical engineer, and John Harris, superintendent, Cincinnati Street Railway Co.

Cleveland, Ohio—M. S. Robinson, director, Cleveland Street Railway Co.

Columbus, Ohio—W. F. Kelly, general manager, Columbus Street Railway Co.

Council Bluffs, Iowa—N. W. Wells, president, and W. S. Dimmock, general superintendent, Omaha & Council Bluffs Railway and Bridge Co.

Davenport, Iowa—James P. Lardner, secretary and treasurer, Tri-City Railway Co.

Dallas, Tex.—W. H. Sinclair, Dallas Street Railway Co.

Derby, Ct.—W. B. Potter, engineer, Derby Street Railway Co.

Des Moines, Iowa—Geo. B. Hippee, general manager; J. S. Goodell, superintendent motor power, and W. G. Owings, superintendent, Des Moines City Railway Co.

Detroit, Mich. — Thos. Farmer, mechanical engineer, and Chas. Remelins, Detroit Citizens' Street Railway Co.

Evansville, Ind.—W. L. Stockton, electrician, Evansville Street Railway Co.

Fall River, Mass.—Robert S. Goff, president and general manager, Globe Street Railway Co.

Findlay, Ohio—C. D. Kinney, treasurer; Jacob Strader, secretary; J. A. Bope, vice-president, and Chas. Smith, superintendent, Findlay Street Railway Co.

Galveston, Tex.—Paul P. Young, manager, Galveston City Railway Co.

Gerardville, Pa. — B. W. Ash, Schuylkill Traction Co.

Hamilton, Ont.—J. B. Griffith, manager, Hamilton Street Railway Co.

Harrisburg, Pa.—F. B. Musser, superintendent, Harrisburg Traction Co.

Hartford, Ct. — Wm. Gruten and E. S. Goodrich, Hartford Street Railway Co.

Hazelton, Pa.—H. Markle, general manager, and G. W. Thompson, superintendent, Lehigh Traction Co.

Houston, Tex.—A. H. Hayward, Houston City Railway Co.

Johnstown, Pa.—H. C. Evans, Johnstown Passenger Railway Co.

Kansas City, Mo.—C. F. Holmes, manager; Martin H. Holmes, vice-president, and A. E. Siebert, master mechanic, Metropolitan Street Railway Co.

Lawrence, Mass.—W. P. Clark, Lowell, Lawrence & Haverhill Street Railway Co.

Lexington, Ky.—C. H. Stoll, president, and R. T. Gunn, superintendent, Belt Electric Line Co.

Lock Haven, Pa.—John A. Seely and H. N. Harrison, Lock Haven Electric Railway Co.

London, Ont.—C. E. A. Carr, general manager and treasurer, London Street Railway Co.

Long Island City, N. Y.—George Chambers, general manager, Steinway Railway Co.

Louisville, Ky.—J. O. Haddox, superintendent; T. J. Minary and W. T. Cook, chief electricians, Louisville Railway Co.

Lynn, Mass.—Col. J. N. Cunningham, vice-president, Lynn & Boston Railroad Co.

Memphis, Tenn.—F. G. Jones and Frank Smith, Citizens' Street Railway Co.

Milwaukee, Wis.—C. D. Wyman, general manager, Milwaukee Street Railway Co.

Minneapolis, Minn.—C. G. Goodrich, vice-president, Twin City Rapid Transit Co.

Mobile, Ala.—J. F. McAviney, electrician, Mobile Street Railway Co.

Meriden, Ct.—N. H. Heft, president, and Wm. J. Stark, Meriden Street Railway Co.

Nashville, Tenn.—E. G. Connette, Geo. Swint and H. C. Burraugh, Nashville Street Railway Co.

Newark, N. J.—Andrew Radel, superintendent, Newark & South Orange Horse Railroad Co.

New Bedford, Mass.—E. E. Potter, general manager, and Charles F. Shaw, treasurer, Union Street Railway Co.

New Brunswick, N. J.—Andrew Radel, director, Brunswick Traction Co.

Newburyport, Mass. — Charles Odell, president; James F. Shaw, director, and H. Fisher Eldridge, Haverhill & Amesbury Street Railway Co.

New Haven, Ct.—G. A. W. Dodge, general manager, New Haven Street Railway Co.

New Orleans, La.—Frank R. Ford, engineer, and Ralph L. Crump, assistant engineer, Canal & Clairborne Railroad Co.

New York, N. Y.—E. T. Landon, secretary, Dry Dock, East Broadway & Battery Railroad Co. H. M. Littell, vice-president, and Thomas Millen, master mechanic, Metropolitan Street Railway Co.

Norwich, Ct.—William S. Silver, director, Norwich Street Railway Co.

Newburyport, Mass.—James F. Shaw, director, and H. Fisher Eldridge, director, Newburyport & Amesbury Horse Railroad Co.

Omaha, Neb.—W. A. Smith, general manager, and F. A. Tucker, superintendent, Omaha Street Railway Co.

Philadelphia, Pa.—A. Langstaff Johnston, consulting engineer, Bestonville, Mantua & Fairmount Passenger Railroad Co.

Pittsburgh, Pa.—J. M. Tate, Jr., general manager, Federal Street & Pleasant Valley Passenger Railway Co. Henry Hubbard, mechanical engineer, general superintendent, and E. L. Rodes, chief electrician, Pittsburgh, Allegheny & Manchester Traction Co. John Murphy, superintendent, Second Avenue Passenger Railway Co.

Portland, Me.—W. R. Wood, president; W. A. Wheeler, director; C. A. Newman, general manager, and Frank M. Blaisdell, civil engineer, Portland Railway Co.

Philadelphia, Pa.—J. A. Brill, Manayunk & Roxborough Inclined Plane Railway Co.

Quincy, Ill.—E. H. Stone, Jr., secretary, and J. F. Mare, night foreman, Quincy Horse Railway and Carrying Co.

Racine, Wis.—T. E. Meyers, representative general manager, Belle City Street Railway Co.

Reading, Pa.—M. C. Aulembach, treasurer, and S. E. Rigg, superintendent, Reading Traction Co.

Richmond, Va.—R. L. Williams, treasurer Richmond Traction Co.

Rochester, N. Y.—F. O. Rusling and J. H. Stedman, Rochester Railway Co.

Rockland, Me. — John F. Hill, president, O. O. Gray, vice-president, and Thomas Hawkin, superintendent, Rockland, Thomaston & Camden Street Railway Co.

Salt Lake City, Utah—W. P. Read, superintendent, Salt Lake City Railroad Co.

Springfield, Ill.—C. K. Minary, manager, Springfield Consolidated Railway Co.

Springfield, Ohio—S. L. Nelson, general manager, Springfield Railway Co.

Springfield, Mass.—Wm. S. Loomis, president, Springfield Railway Co.

St. Joseph, Mich.—W. Worth Bean, president, St. Joseph & Benton Harbor Electric Railway and Light Co.

St. Louis, Mo.—D. G. Hamilton, president; Robt. McCulloch, vice-president and general manager; C. C. Duffy, secretary and treasurer, and Richard McCulloch, electrical engineer and chief electrician, Cass Avenue & Fair Grounds Railway Co. J. S. Walsh, D. G. Hamilton, president; Robt. McCulloch, vice-president and general manager; C. C. Duffy secretary and treasurer; Richard McCulloch, chief engineer and electrical engineer, Citizens' Railway Co. Edward Whitaker, president; Geo. W. Baumhoff, superintendent and James Adkins, treasurer, Lindell Railway Co. P. C. Maffitt, president, Missouri Railway Co. John Mahony, vice-president and general manager, and Chas. Green, president, People's Railway Co. Joe S. Minary, manager, and John C. Allen, superintendent, Southern Electrical Railroad Co. R. Lehmann, secretary and treasurer, St. Louis & Suburban Railroad. D. G. Hamilton, president; Christian Peper, vice-president; R. B. Jennings, secretary and treasurer; Robt. McCulloch, general manager; Richard McCulloch, power engineer and electrical engineer, St. Louis Rail-

road Co. John Scullin, president; Harry Scullin, vice-president and general manager; Thomas W. Murphy, general superintendent; Chas. H. Pierson, master mechanic, and Jno. P. Gilbert, master car builder, Union Depot Railroad Co.

St. Paul Minn.—C. G. Goodrich, vice-president, Twin City Rapid Transit Co., St. Paul Division.

Syracuse, N. Y.—Matthew Murphy, auditor, Syracuse Street Railway Co.

Taunton, Mass.—Geo. F. Siebel, superintendent, Taunton Street Railroad Co.

Toledo, Ohio—Albion E. Lang, president; E. J. Buchtel, superintendent power plant, and C. N. Hart, superintendent construction, Toledo Traction Co.

Trenton, N. J.—Chas. Y. Flanders and R. H. Beach, Trenton Passenger Railway Co. (Consolidated.)

Troy, N. Y.—C. H. Smith, superintendent, and J. H. Jones, Troy City Railway Co.

Washington, D. C. — James B. Adams, secretary and treasurer, Columbia Railway Co.

Wheeling, W. Va.—Michael Loftus, superintendent, Wheeling Railway Co.

Wilkesbarre, Pa.—J. C. Friexill, Wilkesbarre & Wyoming Valley Traction Co.

Williamsport, Pa. — Ernest H. Davis, general manager; J. W. Cochran, assistant manager, Williamsport Passenger Railway Co.

Youngstown, Ohio—A. A. Anderson, general manager, Mahoning Valley Electric Railway Co.

THE EXHIBITS AT ST. LOUIS.

The Diamond Truck and Car-Gear Company had several of the "Diamond" trucks of various construction on exhibition in charge of General Manager W. H. Wilkinson and W. H. Ten Broeck.

The Bethlehem Iron Works, Bethlehem, Pa., sent to the Auditorium one of 12 of the shafts made for the following roads of Chicago: Northwestern Street Railway Company, Union Loop Railway Company and the Chicago City Railway Company, in charge of Mr. H. J. Porter, the Chicago representative. The shaft was made by the fluid-compressed, open-hearth process, and is 22 feet 6 inches long, 26 inches at the largest diameter and 22 inches at the journals, with an 11-inch center hole, and weighs 30,000 pounds.

In addition to the pretty pin in the form of a fare register, the New Haven Car Register Company distributed a very artistic monthly calendar made in light leather and gold.

Mr. Chur. of the American Railway Supply Company, 32 Park place, New York, was one of the convention visitors. His company distributed a little enamel souvenir pin to callers.

Several of the improved types of tower wagons for overhead work were sent to the exhibition by the Leona Wagon Company, of Baltimore.

The White-Crosby company, 29 Broadway, New York, erected in the hall a top of one of the poles just as it will be used for the Niagara and Buffalo long-distance transmission, which is to have a capacity of 20,000 horse-power, 10,000 volts and 5,000 horse-power. Mr. H. H. Harrison, of this firm, was a guest at the Southern during the week.

The Johnson company, of Johnstown, Pa., and Loraine, Ohio, had a large space on the main floor, showing all the varieties of the rails, switches, crossings and ground equipment of street railroads made in their mills. Major Evans represented the company, and was one of the prominent New Yorkers present.

Mr. R. D. Mercur, the general agent of the New York Car Wheel Works, of Buffalo, had an office for business at the hall. Their car wheels arrived too late for exhibition. It was said that two-thirds of the wheels on trucks in the hall were made by this company.

The National Air-Brake Company placed their apparatus on one of the cars of the American Car Company, standing on the main floor.

A new brand of insulating compounds were shown by Berry Brothers, of Detroit.

The large booth occupied by the Commercial Electric Supply Company, of St. Louis, was a general rendezvous for visitors at the exhibition hall, where a telephone connection had been made with the city exchange, and callers might have free use.

Their exhibition included lines of electrical supplies made by the following companies: Bryant Electric Company, Hartford; Clifton Manufacturing Company, Electrical Engineering and Supply Company, Syracuse; Holmes, Booth & Hayden, "Habirshaw" wires made by the India Rubber and Gutta Percha Company, the "Electra" carbons imported by Hugo Reisinger, Pass & Seymour, Perkins Electric Switch Manufacturing Company, W. T. MacAllen, manufacturer of street railway supplies; Western Electric Company, Standard Paint Company, manufacturers of P & B insulating compounds; the St. Louis Electric Street Car Heater Company, and the Wagner Electric and Manufacturing Company.

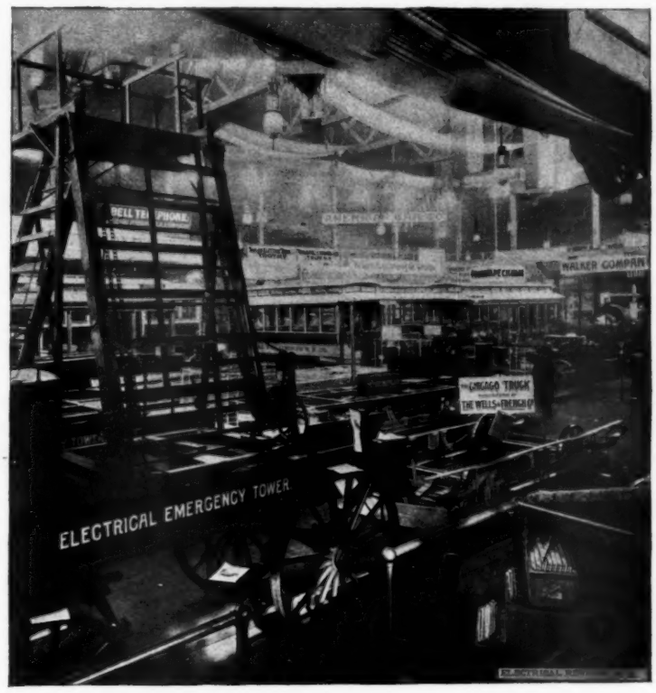

FIG. 1.—GENERAL VIEW OF THE ST. LOUIS STREET RAILWAY EXHIBITION.—LOOKING TO THE RIGHT FROM "ELECTRICAL REVIEW" HEADQUARTERS.

The Chicago Insulated Wire Company, Chicago, showed a line of wire products. Mr. Edward Carroll, president of this company, was also present. The well known Okonite products were shown by both the Central Electric Company, of Chicago, and the Southern Electric Company, of St. Louis.

The Consolidated Car-Heating Company, Albany, had a large exhibit of the Consolidated heaters in charge of Mr. Ransom.

The International Register Company exhibited a line of car registers.

The types of air-brakes made by the Hunt Air-Brake Company, Pittsburgh, were on view.

The various materials for car curtains and seat coverings were shown by Mr. H. S. High, of Clawrence, Whitman & Company, of New York.

The Paige Iron Works, Chicago, showed some models of special track work.

Mr. Arthur S. Partridge, St. Louis, occupied a large space for lines of mica and electrical and railroad specialties, and also the well known carbon brushes and specialties made by the Partridge Carbon Company, of Sandusky, Ohio.

The Marks Railway Equipment Company, Chicago, exhibited a number of rail specialties.

Mr. R. L. MacDuffie, of Wendell & MacDuffie, 26 Cortlandt street, New York, represented the Taunton Locomotive Manufacturing Company, the Rochester Car-Wheel Company and the Jerome Automatic Metallic Packing Company at St. Louis.

A number of the 150-hour Manhattan inclosed arc lamps were used for light in the Auditorium.

The Ohio Brass Works, Mansfield, Ohio, were well represented by Messrs. King and Wilkinson, and had an artistic arrangement of overhead trolley specialties.

The energetic Western Telephone Construction Company, of Chicago, had a booth filled with their modern types of telephone apparatus, including a 100-drop switchboard, exchange instruments and intercommunicating sets for factory and private use. Mr. Chas. P. Platt, of the home office, was in St. Louis superintending the exhibition.

The M. M. Buck company, St. Louis, occupied a large space in the left gallery for their various lines of electric road construction materials.

The Washburn & Moen Manufacturing Company, in connection with the large exhibition of the Central Union Brass Company, of St. Louis, made a fine exhibit of a general line of lead covered, rubber covered, submarine, weatherproof and copper trolley wires, also the "Chicago" rail bond, in charge of their St. Louis manager, Mr. C. H. May.

FIG. 2.—VIEW OF THE STREET RAILWAY EXHIBITION.—DIRECTLY IN FRONT OF "ELECTRICAL REVIEW" HEADQUARTERS.

The John A. Roebling's Sons Company, of Trenton, N. J., on the right side had an exhibit in charge of Messrs. Geo. C. Bailey, A. B. Conover and W. L. Doyle. The "Columbia" rail bond was the feature of

(Continued on page 230.)

Electrical Review

Times Building, 41 Park Row,

P. O. Box 2539. NEW YORK.

EDITOR:
CHARLES W. PRICE.

ASSOCIATE EDITOR:
STEPHEN L. COLES.

REGISTERED CABLE ADDRESS:
"ELECTVIEW," NEW YORK.

1546 "CORTLANDT," TELEPHONE CALL.

Subscription to the
ELECTRICAL REVIEW.

One Year, United States and Canada, - $3.00
One Year, Foreign Countries, - - 5.00
Single Copy, - - - - - - .10

Copies can only be supplied for one year back at 25 cents each.

Special Notice to Advertisers.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue.

NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.

NEW YORK, NOV. 4, 1896.

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The Cumberland Telephone and Telegraph Company informs the ELECTRICAL REVIEW that the recent report that its lines in Nashville, Tenn., would be rebuilt, is incorrect, because the lines are now in first-class condition and are always so maintained. The company built and has now occupied for four years its own building, and it is a model for the requirements of the company. Nashville has been connected with the long-distance system for over a year.

MOISSAN.

The lecture delivered at the College of Physicians and Surgeons on Tuesday of last week was a memorable event for those fortunate enough to be present. M. Henri Moissan, *membre de l'Institut*, spoke for an hour and a half, in clear, mellifluous French, on his researches with the electric furnace in the reduction of refractory elements. He illustrated his remarks with several brilliant experiments, in which he used some 30 horse-power to produce a diamond of perhaps a millimetre in diameter, and to condense a mirror of selenium on the sides of a glass bell-jar placed above the furnace. The selenium mirror there was no doubt of, and the audience willingly took the lecturer's word for the diamond—imbedded as it was in a fused mass of iron—and went wild with enthusiasm. M. Moissan has certainly never had a more appreciative audience nor warmer applause on the banks of the Seine than greeted him last week on those of the Hudson.

In his probings into nature's secrets, Moissan is the antithesis of Dewar. They work at opposite ends of the thermometer. While Dewar delves in search of absolute zero, Moissan soars after fabulous temperatures that would make the fires of the eternal regions blush and droop with envy. With a couple of blocks of quicklime, appropriately fashioned, a pair of stout electrodes, and a 50-kilowatt dynamo behind it all, he produces a temperature of 3,500 degrees centigrade—a degree of heat which may, perhaps, be equaled in the bowels of the earth, but is never approached in the arts.

Moissan consults nature at every turn in his researches. The surroundings among which diamonds are found in nature indicate to him that to force carbon into crystalline form, not only heat but great pressure have been necessary. So he reproduced the conditions by fusing iron and carbon together in his devastating furnace and then cooling the mass suddenly; the change in volume of the iron produces the intense pressure required and the diamond is formed; a microscopic diamond, but still a diamond. Diamonds found in different parts of the world have different crystalline structure. Moissan's diamonds, formed by cooling the fused mass in different ways, exhibit the same differences. Some diamonds have small black spots, called by French jewelers "crapauds" (toads), to indicate their disgust with such unseemly gems; Moissan is charmed when he finds "toads" on his diamonds, for he is reproducing nature. Other diamonds burst, to the dismay of their owners; some of Moissan's diamonds have burst, and his joy has been greater than if they had suddenly turned into Kohinoors. M. Moissan's lecture was delivered at the invitation of a number of scientific societies, among them the American Institute of Electrical Engineers. We heartily congratulate the Institute and the other societies on the brilliant success of the event, and trust that the lecture, which was quite a long one, though none too long for its hearers, will be published in full in the Transactions.

A newspaper rumor is to the effect that the Long Island Railroad is considering the use of electric power. This is almost too good to be true.

The past four years have been "times that tried men's souls." May the next four years, and the next, and the next, be years of prosperity and business success.

"Does any one suppose that, had the National Electric Light and American Street Railway Associations presented a bold front, and declared that 'If ye do it unto the least of these ye have done it unto me,' the trust would have dared to act as it has in the past?"

These words are taken from the editorial columns of a journal which, we regret to say, has any connection with the electrical industry. If the Biblical quotation is not blasphemous, it is at least in shocking taste. We are happy to state that we know that the majority of men working in the various branches of the electrical field are gentlemen of refinement and good sense. We believe they will appreciate that the contemporary from which we quote is, of necessity, fast losing what little influence it has among them when it feels obliged to resort to such practices to sustain its opinions.

Our friends, the Japanese, are a remarkably progressive people and have taken kindly to American ideas and inventions. They have been especially apt to grasp the importance of many of our electrical devices, particularly the telephone. The telephone service of Japan is now quite comprehensive and considerable extensions are in contemplation. As recently mentioned in the ELECTRICAL REVIEW, a commission of Japanese engineers has inspected the telephone systems of our larger cities with a view to adopting the most modern of our improvements in their native country. All this wonderful progress has been made over the day when the first telephone line was opened in Japan, when a national holiday was declared, and when thousands of the natives camped along the line waiting to see the first message go by! And yet the Japanese have no word in their language corresponding to our "hello." They continue, as at first, to ring up and say to each other over the line, "*Anada! Anada!*" This means simply "You! You!"

THE FINANCIAL SIDE.

The expected happened in financial circles this week when call money advanced to 100 per cent. The banks were quick to come to the relief of Wall street, and on Friday, the day following, they were quite liberal loaners. This had the effect of easing the situation and was the cause of a sharp recovery in stocks. In the business world all attempts at discounting the sound-money victory has been frowned upon by the banks, and the lack of funds, except for strictly business purposes, prevented speculation of every description. This is as it should be, as it leaves interests in splendid shape to profit by a general revival of confidence, or, if the worst comes to the worst, to withstand the storm. The retrenchment caused a slight reaction in a number of lines, while in others prices advanced in spite of it. This was notably true of leather, sugar, iron, and in some grades of dry goods. Stocks and bonds will end the week on a level considerably higher than was recorded at the close of last week. Securities are in stronger hands to-day than has been the case in years. Interests who own them will not be apt to realize on a few points advance, and for this reason the Republican victory on Tuesday will, it is believed, be a signal for an almost record-breaking rise in the stock and bond markets.

But very little can be said regarding electrical securities. Those that are listed fluctuated with the balance of the market, while those that were unlisted were dull and firm. A story was afloat in the Street the latter part of the week in effect that the General Electric Company has contracts aggregating $2,000,000 in sight, which will mature if sound money is victorious. This is undoubtedly a conservative estimate, especially if Manhattan, the Metropolitan Traction, and New York, New Haven & Hartford contracts are figured upon.

A gentleman who attended the St. Louis Street Railway Convention, with whom I talked, says that opinion has gained currency among street-railway men that after the election there will be a material advance in the price of apparatus. This feeling, taken in conjunction with an advance within the last week or two, which I understand amounts to about 5 per cent, will be likely to cause a rush to get in on the ground floor, which promises to make things lively for the manufacturing companies, for a while, at least.

There are many reasons for the belief that some of the large contracts now pending will come to a head shortly after election.

Some very conservative capitalists say that, as far as they have been able to learn, there is little danger that the air motor or storage battery will crowd out the underground conduit or third sail. BAIN.

New York, October 30.

Dinner to M. Moissan.

The gentlemen interested in organizing the lecture delivered last week by M. Henri Moissan, of the Institute of France, offered that distinguished scientist a complimentary dinner at the Waldorf on Wednesday last. Some 50 scientific men, college professors, chemists, pharmacists and electricians took part, and the dinner committee, Dr. Wm. McMurtrie, Dr. Cary Hutchinson, Mr. Herbert Laws Webb and Mr. T. C. Martin had every reason to be satisfied with the success of their efforts. That an admirable dinner was provided, goes without saying. In the unavoidable absence of Dr. Louis Duncan, who was to have presided, the chair was taken by Dr. Ogden Doremus, on whose right sat M. Moissan, Prof. C. B. Dudley being on his left.

M. Moissan made a feeling speech of thanks for the generous and thoroughly hospitable reception that had been accorded him wherever he had been in America. He gave an interesting account of his observation of American University life, where the thing which had struck him most, apart from the superb equipment for teaching, was the feeling of affection between the students and the professors. This is one of the things that they do not manage better in France. Interesting, and, in the main, brief and witty speeches were made by Professor Doremus, Dr. Dudley, Dr. Crocker, Dr. Loeb, Dr. Schieffelin, Professor Chandler, Dr. Emery, Mr. Park Benjamin, Mr. Muurling and Dr. Ledoux, while Mr. Martin positively excelled himself in wit and readiness as toastmaster.

There were presented to M. Moissan before his departure for France last Saturday, an engrossed invitation to deliver the lecture, signed by the members of the committee on papers of the various societies, and a small book containing the invitation to the dinner with the signatures of all the participants.

Telephone Infringement Suit.

The Western Telephone Construction Company, of Chicago, has filed a bill in equity, in Philadelphia, against the Philadelphia Standard Telephone Company, Union Traction Company and others, alleging infringement of patents.

PERSONAL.

Mr. C. O. Baker, Jr., the platinum magnate, of Newark, N. J., returned to New York city last week from an extended European trip.

Mr. Ralph W. Gordon, vice-president of the Gordon-Burnham Battery Company, who was elected one of the associate members of the International Association of Fire and Police Telegraph Superintendents, is heartily in favor of the organization and writes as follows to President Mason: "After conversing with many superintendents throughout the country, I am confident that the future success of our association is now assured."

Electrical Men Parade for Sound Money.

Under the auspices of the Electrical Sound-Money Club about 2,000 men connected with the electrical industry in New York city and vicinity took part in the business men's sound-money parade in New York last Saturday. Gen. C. H. Barney, of the New York Telephone Company, acted as marshal of the electrical brigade, which presented a very fine appearance. The music was supplied by two bands and two drum corps, and owing to the number of National Guardsmen comprised in the electrical brigade, the marching was much above the ordinary. At various points along the march the cheering for the electrical men was vociferous.

A Sure Test For Death.

TO THE EDITOR OF ELECTRICAL REVIEW:

Referring to your editorial notice in the last number of the ELECTRICAL REVIEW concerning the use of the Roentgen rays to determine the death of a person, let me draw your attention to the following facts, which may prove of interest to your readers.

It is well known that electro-muscular contraction, as elicited by the application of the well moistened electrodes of a Faradic battery to the human body, ceases within a certain time after death, latest, I think, 90 minutes. That test most are acquainted with.

For years the French Academic des Science kept up the standing offer of a large reward for the discovery of an infallible sign of death, which could be applied by the most ignorant. That reward was given to a Frenchman some 25 years ago.

When in a darkened room you hold your open hand with finger touching finger in front of a candle light, you will see the bright red color of the circulating blood shine through the skin where finger touches finger. The Frenchman referred to discovered that this sign ceases the moment death occurs, and a most thorough investigation showed that neither in catalepsy nor in any other variety of apparent death is this sign ever wanting; it disappears only with death. Simple as the sign is, easily as it is applied under the most varied conditions, even by the most illiterate, yet it is the surest indication of that congealing of the tissues, which sets in synchronously with death—it indicates the cessation of life's current of motion. Science knows no more reliable test of death; I doubt whether a simpler will ever be discovered.

If it were a question, somewhere in the wilderness, to determine the question whether death had occurred or not, it might be difficult in procuring X rays—for even I, though living in one of the best quarters of Philadelphia can not apply it because of the absence of the electrical current needed, unless I want to take the trouble of a special battery—but a flame, whether from a candle, match or piece of paper, can always be had, and with it the sure test of death above described.

Very respectfully yours,

DR. HUGO ENGEL.

Philadelphia, October 28.

Seeing the Heart Beat.

The following interesting dispatch from Ann Arbor, Mich., recently appeared in the Detroit *Free Press:*

A most extraordinary series of experiments were tried last evening and to-night at the physical laboratory of the University of Michigan, under the direction of Prof. H. S. Carhart, assisted by Dean V. C. Vaughn, of the medical department, and Drs. W. J. Herdman and F. G. Novy. By means of skillfully contrived apparatus these gentlemen and a few invited guests were able to see the heart pulsations of a living man and watch the play of the bones in various parts of the body when in motion. It was a marvelous sight, and one that inspired the less scientific beholders with profound awe.

When the guests entered the room in which the experiments were to be tried there was nothing in sight but a lot of familiar electrical apparatus. A new induction coil stood on a table. Four cells of a storage battery stood under the table. A resistance coil stood alongside. A few scraps of insulated wire, a pair of Crookes tubes and a curious-looking box completed the equipment. It was soon explained that this box was the important element in the experiment. The spectator was to glue his eyes to the opening at the small end and look hard at the black pasteboard in front of him. The room was then darkened and the battery turned on, a new Crookes tube of great power being put in the circuit. As soon as the box was turned toward the tube the inky darkness of the interior of the box disappeared and the black pasteboard became grayish-white, like a pane of ground glass. Professor Carhart then thrust his hand between the tube, now brilliant with the peculiar greenish phosphorescent light that accompanies the production of the X rays, and every bone became distinctly visible on the pasteboard screen, surrounded by a cloudy outline showing the limits of the fleshy covering. The X-ray photograph is shadowy, vague and unsatisfactory compared to the results obtained in this new manner. The thinnest gauze more obscures an object to the eye in sunlight than did the covering of skin and muscle obscure the bones in Professor Carhart's hand. Then his wrist was put in, and his arm to the shoulder. The wrist was turned, the elbow flexed and straightened, and the arm twisted back and forth. It was like watching a skeleton in a slight haze, mysteriously endowed with the power of self-motion. The clothing was no hindrance to the vision, the rays passing through clothing as readily as the naked flesh.

Then Dr. Novy tried a few objects in the field, and finally sat before the tube and allowed the spectators to count his ribs, and suddenly it was discovered that the heart was visible, and that its pulsations could be watched and counted. The heart was misty in outline, not distinct like the bones, but there it was, moving regularly, and the spectator counted its pulsations while Dr. Herdman stood with his finger on Dr. Novy's pulse to verify the count and make sure it was not the flickering of the light that misled the eye.

The inside of the screen to the curious box was covered with a layer of tungstate of calcium, by means of which layer the X rays were transferred into rays of light that affect the eye, thus making the X ray visible. An effort will be made after a while to fix a large screen in a doorway, so that all of an audience in a dark room can see the pictures simultaneously, the room supplanting the box. In this way the whole skeleton of a man may perhaps be shown at once, and at the same time walking about.

THE GREAT STREET RAILWAY CONVENTION.

(*Continued from page 227.*)

their exhibit. Secretary H. L. Shippy was present.

The St. Louis Car Company had placed on the main floor one of their No. 8 solid-steel four-wheel trucks and a solid-steel double truck. Of the latter type, it is said that 400 are in daily use in the city of St. Louis.

The Central Union Brass Company, St. Louis, occupied a large space for their various lines of railway supplies for which they are agent; among which are Bowers Brothers' mica specialties, the Billings & Spencer company's drop forgings, overhead trolley equipments and carbon materials. A unique souvenir in the form of a miniature trolley was given away by this company.

The Taylor Electric Truck Company, of Troy, N. Y., was represented by Mr. John Taylor in person. One of their trucks, known as the "Taylor improved radial truck," and one known as the "Empire State radial truck," were on the main floor.

The Brownell Car Company had in the hall one of the cars just built for the Metropolitan Street Railway, of Kansas City. The body of the car is 30 feet long, with a four-foot platform, and a total length over bumpers of 36 feet.

The Johnstown Steel Motor Company, Johnstown, Pa., was represented by G. W. Henry and E. C. Parham. Their apparatus on view were two motors on a DuPont truck and a controller of the locking and interlocking type, with the motor cut-out incorporated in control of reverse lever.

The Brill company exhibited a 10-seat open car, representing the standard style. The interior finish throughout was solid ash, with decorated birch veneered ceiling. The feature of this car was the development of a long-felt want in the matter of curtains. The Brill company showed their improved and patented round-corner seat-end panel. By means of this panel the objectionable protruding corner is obviated, and it is possible to carry the curtain in grooves on the outside of the panel from the water table to the sill, without any possibility of wearing out the curtain, due to contact with the corner. This unquestionably attracted widespread attention, and was acknowledged to be an extremely valuable improvement. There was also on exhibit one Brill snow-sweeper, having Westinghouse motors mounted on the broom-driving shaft for the purpose of showing the operation. These sweepers are used extensively in St. Louis, and, in fact, all over the country. There was also on exhibition at the Auditorium a Brill No. 21 E truck, having solid forged axle-box frame, developing simplicity in construction, owing to the absolute freedom from bolts, nuts or rivets. This truck has developed a feature at which the Brill company have been working at for a number of years; *i. e.*, the arrangement of a system of springs of different capacities for the purpose of overcoming oscillation. The journal-box springs are designed of strong tension, having a capacity of 5,000 pounds, each with one-inch compression. Their object is to spring-support the entire vehicle. The spiral springs located at either side of journal boxes are designed of sufficient capacity to suit the weight of car body, and are called upon to take up the vertical motion. Outside of the spiral springs is a new feature of this truck; that is, the half-elliptic spring. By actual tests they have demonstrated conclusively that the half-elliptic spring under strain will return to its normal condition with less motion than the full elliptic, and, furthermore, does not possess the tendency of increased movement in regaining its normal condition. The truck has Brill journal boxes, self-oiling and dust pipe.

The Brill No. 27 truck, which has gained such merited fame by its successful operation on the Buffalo & Niagara Falls Electric Railway, was also shown at the Auditorium. This truck is properly named, "A perfect passenger truck." It develops the only improvements which have been made in passenger trucks since 1873, and this improvement consists of suspending the spring plank on equalizing bars through a medium of swingings spring links, located outside the line of the rails. This gives a wider base of support to the car body, and precludes any possibility of the bolster coming in contact with the wheel-pieces. The swing links being of a draw and recoil type of springs, ease the bolster when the truck strikes a curve. Their adoption by the Akron, Bedf rd & Cleveland road, the Cleveland, Painesville & Eastern, and Cleveland & Lorain, seems to indicate that the Brill people have in this truck notable features. Outside the hall and directly in front of the entrance was a Brill standard sprinkling car with patented spraying device, insuring perfect distribution of the water. The water leaves this device in a film, separates at a distance of about two feet from the center and falls in a spray extending about nine feet outside of the rail line. This accomplishes more in even distribution of the water than can possibly be obtained by the use of perforations.

The Brill headquarters were at the Southern Hotel, parlor 82, where models of Brill No. 21 E truck, No. 21 C truck, No. 27 truck, the "perfect passenger" truck and the Eureka maximum traction trucks were on exhibition. The numerous friends of the Brill company were courteously entertained by Mr. John A. Brill, Samuel M. Curwen, F. C. Randall, George M. Haskell and Wm. H. Heulings, Jr. They distributed a Brill souvenir, embodying the history of this notable company since its inception to the present time, and showing the different improvements in car and truck construction.

A visit to the magnificent new building of the *Globe-Democrat* was made by a party of street railway men and newspaper men attending the convention. The typesetting machines proved a great point of attraction for the fare-accumulating gentlemen, and each carried away a token in the shape of his name on a slab of lead.

A great many of the souvenirs were in the form of stick pins, badges and medals, and some of them were tossed on the stage of the theater when some of the interested railroad men desired to show their appreciation of the excellent work of the performers behind the footlights. In one instance a medal was promptly worn by a young lady vocalist, and when the gallant donor followed it up in person with a bouquet at the stage door later, the husband of the actress kindly proffered his services as messenger boy. Under the circumstances, his offer was accepted.

Each visitor to the Anheuser-Busch brewery was presented with a very handsome nickel-plated corkscrew in the shape of a miniature beer bottle. These little tokens were greatly appreciated.

Immediately after the selection of Niagara Falls as the next place of meeting, some very neat badges containing a picture of Niagara Falls with "1897" on them appeared, and were widely distributed to all the people at the convention. It is evident that those Niagara Falls fellows are enterprising.

The daily reports of convention matters in the St. Louis *Republic* attracted attention from every one by their excellence. The method was original, and the result has never been excelled by any local daily where conventions have been held.

The well known Sterling Supply and Manufacturing Company, of New York city, which is a large manufacturer of supplies for electric railways, and makes a specialty of the Sterling insulation, was represented at the convention by Mr. J. J. Kennelly, superintendent. There were numerous inquiries also for Mr. J. H. Carson, the head of the company, who had intended to be present, but on account of the rush of new business was unable to leave New York.

In connection with the apparatus shown by the Standard Air-Brake Company, it was remarked by a visitor that the space in which it was shown was usually surrounded by motormen of the local street roads, who were quick to see the great importance of this modern form of life and labor-saving apparatus.

A large panel showing the different styles of car curtains made by the Brussells Tapestry Company, Chauncey, N. Y., was a feature of the main floor.

A novel souvenir, distributed by Eugene Munsell & Company, of Chicago and New York, was a commutator segment in mica.

A working model of an underground conduit system, shown by the Munson Electric Conduit Company, Chicago, attracted the attention of adherents of this form of conveying power.

Messrs. M. M. Hayden and Richard O'Connor represented the National Carbon Company, of Cleveland, at their exhibit of carbon specialties.

The Electric Railway Equipment Company, of Cincinnati, was unable to make its intended exhibit, owing to sickness in the family of Mr. S. J. Wick. The company, however, was worthily represented by Mr. E. P. Morris, New York agent, and by Mr. W. R. Mason, of the Mason Electric Equipment Company, Chicago agent. This company is making a specialty of electric railway supplies.

The New York Belting and Packing Company, through the St. Louis office, made an exhibit of the interlocking rubber tiling. Messrs. A. G. Francis and I. H. Dickinson were in attendance for the company.

The large cable, which was not carried into the Auditorium because of its great size, made by Broderick & Briscomb Rope Company, of St. Louis, was of general interest.

The Fletcher trolley specialties, shown by Fletcher & Stone, of St. Louis, were new features in overhead construction work.

The space occupied by the Walker Manufacturing Company, of Cleveland, was one of the largest on the main floor. The apparatus sent to the exhibition was one 800-kilowatt armature, rope-driven, one of 12 machines, built for the Chicago Street City Company. one 75-horse-power railway motor and controller and one of each of the 50, 35 and 25-horse-power types with controllers. Mr. J. H. Gates was in charge. Messrs. A. J. Davidson, W. H. Bone and M. B. Barr were present.

The Creaghead flexible pole brackets for trolley construction were shown by the Creaghead Engineering Company, of Cincinnati.

An elaborate booth was arranged by the Kraushaar Lamp and Reflector Company, St. Louis, showing bronze and brass car trimmings; in charge of Mr. Al. Mynders.

Mr. E. L. Adreon, Jr., St. Louis, showed for the Sargent company, of Chicago, their brake shoes and steel castings.

The R. D. Nuttall company, Allegheny, Pa., was well represented by a line of their overhead trolley equipments.

Messrs. Geo. A. Walker, vice-president of the Weber Railway Joint Manufacturing Company, of New York, and Percy Holbrook were in St. Louis.

Wm. Wharton & Company, Philadelphia, had a large space on the main floor filled with the various forms of rails and frogs. A number of the metallic disk globes and angle valves, made by the Crane company, of Chicago, were exhibited.

The General Electric Company made a very comprehensive exhibit. It included almost every device used on electric railroads, with the exception of the generators. The most prominent feature was one of the motor trucks which is to be operated on the Brooklyn Bridge structure at New York. This truck carries two G. E. 50 motors, a special motor, designed to meet the peculiar conditions of the bridge service. One of the controllers used to operate this bridge-car equipment is also shown. A Peckham truck is shown with complete electrical equipment of two G. E. 1,000 motors and electric brakes, controlled by a B 3 series parallel controller. This was in operation, and was the center of attraction for great numbers of electric railway men interested in the operation of the electric brake and the G. E. 1,000's. Many favorable comments were made on the positive action of this brake, and the startling suddenness with which the motion of the wheels was brought to a stop. A handsome switchboard of the well known panel type, made up of generator and feeder panels, with full equipment of standard instrument, was set up at the rear of the space. One of the panels was a station panel, carrying a Type G recording watt-meter measuring, and recording the total watt output of the station. The motor department was represented by handsomely finished examples of the G. E. 800, G. E. 1,000, G. E. 1,200 and 2,000 types of motors. An unfinished G. E. 800 armature was used to bring home to the delegates the method of manufacture employed in turning out the G. E. railway motor armatures. The work of the General Electric Company in the steam railroad field was emphasized by a large photograph of the 96-ton locomotive, coupled with a Royal Blue express train on the Baltimore & Ohio railroad and by a sample length of the overhead conduit with the contact shoe, used for the operation of the said locomotive. A length of the third rail over which regular trains are now being operated between East Weymouth and Nantasket Junction, on the main line of the Old Colony Division of the New York, New Haven & Hartford Railroad, served to illustrate another electrical system for steam railroad work. The space was handsomely illuminated by a large script sign, and by the famous G. E. monogram in varicolored miniature incandescents. Around the space and under the gallery were a series of 10 Thomson arc lamps for use on railway circuits. The new apparatus, shown outside of the brake, comprised the M automatic circuit-breaker for car and other work, a modified form of the K automatic circuit-breaker for station and work of that character, railway and arc lightning arresters and other minor devices. A full supply of the literature of the company, covering railway matters, was spread upon the table around a handsome

bust of Thomas A. Edison, and the company issued for the occasion a beautifully printed guide book of St. Louis, containing illustrations of almost every point of interest in that city, and especially of the fine stations equipped with its apparatus. To its special friends the General Electric Company presented a photograph in bas-relief of the G. E. 1,000 motor. The headquarters of the company were located in the main parlor of the Southern Hotel. This parlor was courteously tendered to the association by the company for their reception on Tuesday evening. The parlor was handsomely decorated with ferns, and a contingent of the company was always present to receive the visiting delegates. One of the features of the convention was the informal reception held by the ladies every evening in the smaller parlor of the headquarters. Here, at about 10 o'clock at night was gathered everybody of prominence in the street railway field present in St. Louis, together with their wives, and for almost four hours the feast of reason and flow of soul ran evenly on its course. Mr. Clark is to be congratulated upon the success which met his efforts to uphold the reputation of the General Electric Company in every particular at this convention.

The Johnson company, the widely known street-rail manufacturers, of Lorain, Ohio, and Johnstown, Pa., were represented at the St. Louis convention by the following gentlemen: H. C. Evans, New York; A. S. Littlefield, Chicago; O. C. Evans, Cincinnati; W. W. Kingston, Atlanta, Ga., and William Jens, assistant chief engineer.

The Consolidated Car-Heating Company, of Albany, were represented at the convention by Messrs. Henry N. Ransom and W. P. Cosper.

The Campbell & Zell company, of Baltimore, were represented by Mr. T. A. Wilkinson, western agent, Chicago, and Mr. J. Vernon Campbell, president, Baltimore.

Valentine & Company, of New York, Chicago, Boston and Paris, sent the following gentlemen as representatives: Charles E. Morrill, F. W. Snow and G. Fred Collins.

George Kissam & Company, of New York, were represented by Mr. George Kissam.

Mr. W. E. Cooke, general manager of the Peckham Truck Company, is one of the recognized indispensables at street-railway conventions, and numbers a very large number of friends in this field.

Mr. W. B. Cleveland, of Cleveland, Ohio, was one of the pioneer electrical men present.

Mr. G. A. W. Dodge, of New Haven, Ct., is one of the well known street-railway men of the country and a regular attendant at these conventions.

Mr. Clinton L. Rossiter, the able president of the Brooklyn Street Railway, was a welcome visitor at this, his first convention. Mr. Rossiter is a strong man in this field.

The Ready Rock Asphalt Roofing Company, St. Louis, was one of the local manufacturing houses which took advantage of the opportunity to bring their products before the attention of the street railway industry by an exhibit.

A number of models of frogs, curves, switches, turn-outs and crossings were shown by the Elliot Frog and Crossing Company, of East St. Louis. The Messrs. Elliot were in attendance much of the time.

A delicate little booklet in the form of a bunch of cards tied together by a red ribbon, was circulated by Krotz, Allen & Kelly, of Springfield, Ohio, illustrating in half-tone the operation of a system of the "K. A. K." method of underground conduit as in service during last Winter. Mr. Ezra H. Linley, St. Louis, had a large space filled with the railroad specialties of the Cambria Iron Works, Nicholson File Company and Columbia Screw Company.

The meeting hall at the Auditorium was boarded off at one corner, the chairman being at the bottom of the amphitheater, which will explain President Littell's remarks that the street-railway men were where they could "look down" on him. It was quite cold at times in the meeting-room, but, as a rule, everybody was comfortable. Those souvenirs containing fluid extracts were occasionally quite popular because of their warming effects.

The ELECTRICAL REVIEW, *Street Railway Journal* and *Street Railway Review* were the only journals with headquarters in the exposition, and these were conveniently located at the meeting-room entrance, and formed excellent resting points for the members waiting for the convention to be called to order.

Mr. D. B. Dean, of the Terre Haute Car Manufacturing Company, is a regular conventionite, and increased his host of friends at the St. Louis gathering.

Mr. E. D. Draffen represented the Safety Insulated Wire and Cable Company, of New York.

Mr. J. H. McGraw is probably the most widely known publisher in the street railway field, and his able counsel in regard to the affairs of the association is always sought.

The Electric Storage Battery Company, of Philadelphia, may well be proud of the interest taken in their storage-battery work by the convention. The wide-awake street-railway men are keeping a sharp eye on the development in this field.

Mr. A. W. Paige, of the famous ironworks bearing his name, and his superintendent, Mr. E. S. Nethercut, were greeting friends continually at their headquarters.

The Standard Underground Cable Company was represented by Mr. J. R. Wiley, western manager.

Among the distinguished visitors at the convention were Hon. Chauncey I. Filley, Hon. Fred W. Lehman and Postmaster John B. Harlow, all of St. Louis.

It was regretted by all that Mr. C. S. Sergeant, of Boston, was compelled to return home immediately after his arrival in St. Louis on account of a death in his family.

The new electric car-heater of the H. W. Johns Manufacturing Company, which attracted so much attention, is the invention of Mr. J. E. Meek, of the company, and is named "Electrotherm." The place where this heater was on duty was a very popular one during the chilly hours of the day, for here all could be warmed.

The Electric Storage Battery Company, of Philadelphia, was represented at the St. Louis convention by Herbert Lloyd, general manager, and Mr. J. R. Williams, the general agent.

The New Process Raw Hide Company, of Syracuse, sent as their representative to the St. Louis convention, Mr. A. C. Vosburgh, secretary and treasurer.

The American Electric Heating Corporation, of Boston, were represented at the St. Louis convention by the following gentlemen: Messrs. H. P. Broughton and F. P. Luther.

The Billings & Spencer company, Hartford, Ct., was represented by Mr. Wallace B. Post, at the St. Louis convention.

The Standard Paint Company, New York, were represented in a great measure at the St. Louis convention by their agents in that city. In addition were their own direct representatives, Mr. J. C. Shainwald, western sales manager, Chicago, and Mr. R. J. Redick, St. Louis.

The Standard Air-Brake Company, New York, had the following representatives at the St. Louis convention: Mr. E. J. Wessels, general manager; Henry P. Merriam, chief engineer, and Charles Davis, clerk.

William Wharton, Jr., & Company, of Philadelphia, were represented at the St. Louis convention by the following named gentlemen: Mr. F. P. Howe, vice-president, and Mr. A. W. Slee, western agent.

The exhibit at the convention this year included a remarkably large list of the most important manufacturing firms, such as the Johnson company, J. G. Brill company, Westinghouse Electric and Manufacturing Company, General Electric Company, Peckham Truck and Motor Company, and others which might be mentioned. This is an indication that the value of these annual conventions is recognized more than ever by the strong manufacturing element.

A very comprehensive exhibit was made by the Johnson company, of Johnstown, Pa., and Lorain, Ohio, which included the following modern ground equipment: A nine-inch girder, with a "Guarantee" crossing point of harveyized steel, giving a very much greater life than the ordinary crossing tongue switch, mate and frog; an exhibit of solid rolled crossing of the steam railroad type, with solid joints; a section of heavy rail, with the upper wheel surface four and one-half inches in width; a section of No. 9½ wire guard rail, weighing 117 pounds to the yard; section of nine-wire, side-bearing rail; braced tie-plates, joints, spikes, and special work sufficient to give an excellent idea of the tremendous amount of construction work made by the mills of the Johnson company.

The Stirling company, Pullman Building, Chicago, Ill., manufacturers of the widely used Stirling water-tube safety boiler, had representatives in the exhibition hall from the Chicago office, and also distributed some interesting literature relative to the efficiency of this type of boiler, which was of special interest, as some of the most modern railroad plants constructed in this country have batteries of the Stirling boilers. One of the notable, and the one, perhaps, which is most frequently referred to, is that of Detroit, which has a battery of Stirling boilers, relative to which a representative of the ELECTRICAL REVIEW was recently informed that, as to economy of operation, no power plant in the world had exceeded it.

The Pennsylvania Steel Company, of Steelton, Pa., was represented at the St. Louis convention by Mr. Mason D. Pratt and Mr. C. W. Reinoehl.

The H. B. Camp Company, Aultman, Ohio, sent as a representative to the St. Louis convention Mr. A. L. Daniels, their traveling salesman. Their exhibit consisted of a laid-up section of nine-duct conduit, together with single ducts and patent mandrel, thereby showing our complete patent system of underground conduits for electrical wires.

The H. W. Johns Manufacturing Company, New York, were represented by the following gentlemen at the St. Louis convention: J. E. Meek, New York; J. H. MacLennan, St. Louis, and E. B. Hatch, Hartford, Ct.

The Rochester Car-Wheel Works, Rochester, were represented at the St. Louis convention by Mr. F. D. Russell, general manager, and Mr. George C. Morse, general sales agent, Taunton, Mass., also by both members of the firm of Wendell & MacDuffie, their New York representatives.

The Standard Underground Cable Company, Pittsburgh, Pa., were ably represented at the St. Louis convention by Mr. James R Wiley, manager of their western sales department, Rookery Building, Chicago, and Mr. Frank C. Crosby, superintendent of construction.

The New York Car-Wheel Works, Buffalo, were represented at the St. Louis convention by their general agent, Mr. Robert J. Mercur, and their New York agent, Mr. John A. Granger.

The Pittsburgh Car-Wheel Company sent their local agent, Mr. J. D. Rhodes, as their representative to the St. Louis convention.

The Walker company representatives who were present at the St. Louis Street Railway Convention were: W. H. Bone, secretary and manager; B. M. Barr, sales agent, Cleveland, Ohio; J. Holt Gates, sales agent, Chicago, Ill.

The Adams & Westlake company, of Chicago, were represented at the St. Louis convention by the following gentlemen: Mr. Fred B. Jones, H. E. Keeler, L. A. Gray and Wm. S. Bartholomew.

The Hooven, Owens & Rentschler company, of Hamilton, Ohio, had, as representatives at the St. Louis convention, Messrs. J. C. Hooven, G. H. Helvey, J. J. Sullivan, J. A. Vail and W. B. Mayo.

The Taunton Locomotive Manufacturing Company, of Taunton, Mass., were represented at the St. Louis convention by Messrs. Wendell & MacDuffie, 2 Cortlandt street, New York, their selling agents for their street railway appliances.

The McGuire Manufacturing Company, Chicago, sent the following representatives to the St. Louis convention: Messrs. W. J. Cooke, M. G. Hubbard and G. F. Collins.

The John A. Roebling's Sons Company, Trenton, N. J., were represented at the St. Louis convention by Messrs. George C. Bailey and A. B. Conover, of their Chicago store, and Mr. W. L. Doyle, of their Trenton office.

The Peru Electric Manufacturing Company, of Peru, Ind., was most ably represented by R. H. Bouslog, secretary and treasurer, at the St. Louis convention.

The Steel Motor Company, of Johnstown, Pa., was represented at the St. Louis convention by Mr. George W. Henry, general sales agent, and Eugene C. Parham, electrician.

KIND WORDS.

WILLING TO STEER BY THE "REVIEW."

TO THE EDITOR OF ELECTRICAL REVIEW:

Herewith please find American Express Money Order for three dollars, for the REVIEW for one year. I would as soon go to sea in an open boat, to Iceland cold without a coat, as to be without the REVIEW. Please pardon my delay in sending pay.

Yours for sound money paid on time. CHARLES N. CRAIN.

October 24.

FROM CALIFORNIA.

TO THE EDITOR OF ELECTRICAL REVIEW:

Inclosed please find $3.00 in payment for my subscription for the ELECTRICAL REVIEW for the year 1896, which, owing to the great rush of business connected with the starting of a new plant, has been omitted thus far. Please send the REVIEW right on and we will try to keep up our end of it. Very truly yours,

J. S. E.

Fresno, Cal., October 19.

TRACK AND TRACK JOINTS, CONSTRUCTION, MAINTENANCE AND BONDING.

ABSTRACT OF A PAPER READ BEFORE THE AMERICAN STREET RAILWAY ASSOCIATION, ST. LOUIS, MO., OCTOBER 20, 1896, BY M. K. BOWEN.

After signing a contract to tell my associates in business how to construct and maintain a street railway track, I began to cast around for data bearing upon the subject, and found that the life of a rail was measured by the wearing out of the head, and less than 12 per cent was worn away before we sold the old rail for scrap, hence the deduction that the point of contact between the wheel and the rail, in other words, the bearing and wearing part of the track, was the most important consideration. I asked a wheel manufacturer why wheels of street-railroad cars were made conical or beveled shaped instead of flat. His answer was, "To draw out of the mold, of course." Not being satisfied, I asked a steam-railroad man the same question; he said it was for the purpose of compensating on curves for the further travel of the outside wheel.

If I had asked a street-railroad man the same question he would have promptly and correctly answered (even if he did not know and had to guess) that the bevel on a car wheel was for the purpose of centering the car on the track, providing a means for a lagging wheel to catch up again, maintaining the axles of the car at right angles with the rail of track. The foundry man was wrong, because we all know that flat wheels can be made. The steam-railroad man, when he answered, had in mind his 10 degrees maximum curve, but in applying his answer to our conditions he was wrong, because on a quarter-circle curve of 50 feet radius, 30-inch wheels, the outside wheel is compelled to travel seven feet four and three-quarter inches farther than the inside wheel, and the absurdity of the bevel of one-quarter inch on a two-inch tread compensating for this travel, and preventing slipping, is readily apparent, as it would riquire a bevel of one and eleven-sixteenths inches in a two-inch tread to compensate for the difference in travel of the wheels. The effect of the slipping of wheels on curves is clearly shown by the brightness of the rails, showing abnormal wear.

The street-railroad man was right, because if he stands behind any of his receding cars he notices the movement of the car from side to side with a rhythmic motion, which tells of an action taking place. The analysis of the action develops a coal-saving, wear-saving movement, always at work; a sort of a silent partner, producing part of your dividend, for if this motion did not exist the wheel which once got behind, an axle which once assumed a position not at right angles with the truck, would be apt to remain in its faulty position during the entire trip, requiring excess of power to haul the car and abnormal wear of wheel and rail, resulting in sharp flange wheels and short life of rail.

Take, first, a conical wheel running on a rail, the surface of which is level. In a few months, if we again examine our wheel and rail, we will not find them the same as when we first looked at them. We now observe that the wheel is badly worn next to the flange, while the inner edge of the head of the rail has flattened to a considerable extent and worn down. Both the wheel and the rail are doing their best to come to a common bearing surface, but it is at the expense of scrap wheels, of which only half of the tread has been worn through the chill. It is quite plain that the rate of wear must be enormous at first, for the whole weight of the car is brought to bear upon a very small surface, almost a point, I might say. This rate of wear steadily decreases as the surface of the rails and wheels wear themselves away until the contact between the two is a line the whole width of the rail, and not merely a point. But long before the surface of the rail has conformed to the surface of the wheel tread, where the best form is attained, the head of the rail has lost a large per cent of the metal allowed for wear, and as wheels wear faster than rails, it has taken, in some cases, thousands of quickly worn out wheels to bring the rail to its final and best form.

I come now to what has been heretofore the weakest part of track construction, namely, joints. Once weakened, they rapidly grow worse, and not only are the rails worn at such joints, but the rate of wear of the car equipment is greatly increased. Were it only possible to get rails in continuous lengths just as one gets trolley wire, the railway manager would be happy; but as it is we must do our best to overcome the difficulty found in making rail joints solid and rigid, to withstand the severe strains which come upon them. What we want is some method of keeping the rails from pulling apart at the joints, due to contraction and spreading outward at joints, and the shape, due to the outward pressure of the car wheels, and from bending down at the joints, due to the pounding and weight of the cars. The joint I have used for the past year is a cast-welded joint. This has been found to give perfect satisfaction as a joint; it is strong and substantial, as has been proven by its holding under the extreme changes in temperature for which Chicago is noted. Seventeen thousand joints were put in in 1895, and of those only 154 joints were lost. The joint in comparative tests has been shown to be far stronger than the rail itself, and such breakages as have occurred were due to a flaw in the metal. The metal cast around the joint has eight times the cross-section area that the rail has. Hence, considering steel as four times as strong as cast-iron, the joint is twice as strong as the rail. It has been found in some cases where this joint was used at crossings with other tracks, the tracks were apt to be pulled out of shape through the changes of temperature. To overcome this the joint nearest the crossing should be anchored in a substantial manner. The method of making the joint is as follows: The rails at the joint are scraped and brightened, a cast-iron mold is placed around the joint, making a tight fit; into this the molten iron, 25 per cent scrap, 25 per cent soft and 50 per cent hard Silicon pig is poured; the metal in contact with the mold begins to cool and forms a crust, while the interior remains molten. This crust continues to cool and at the same time contracts, forcing the molten metal strongly towards the center, which makes a solid and rigid joint. The top, or bearing part of the ball of the rail, is afterwards filed off perfectly level so that it is very difficult to detect a joint by riding over it or looking for it. Upon breaking a joint which has been well cast, three spots will usually be found where amalgamation has taken place between the rail and cast portion; one on each side of the web and the other on the bottom. These spots are from one and one-half inch to two inches in diameter. There has been some discussion as to its being a bond for carrying electric current. I can not recommend it with certainty, as there are occasional joints which I have taken off where no amalgamation has taken place whatsoever, thus destroying the effect as a bond of all joints in that line of track. To overcome this difficulty I have adopted the plan of bonding all joints. However, future experiments and care in the casting of joints may develop their efficiency as a bond.

Upon organization depends the successful maintenance of the track, and one which I find gives the greatest efficiency is that the system is divided up into sections, consisting of 12 miles of double track each. Each section is put in charge of a working foreman, who is to keep and maintain and repair as cheap as possible, and who is held directly responsible for the condition of the track at all times. He has under him as many laborers as are required to keep his division in repair. This foreman is held completely responsible for all tools, and is required to maintain, at some convenient point on his section, a small place for keeping his tools. All tools which need repairing are sent to the main storeroom, where they are exchanged for others in good condition. All new tools and material required are obtained from the main storeroom. The method employed previous to the above was to send out a gang of men here and there at different points of the system; thus one portion of the system might be sadly in need of repairs long before the gang sent out reached that portion.

The question as to the right time to reconstruct a track is one of the greatest importance, as it often involves the expenditure of thousands of dollars. The question to be solved is, Am I losing money by not rebuilding my tracks? Should I have rebuilt them two or three years ago, or should I have waited a year or two longer? No doubt many of you have been confronted with just such a question as this, and worried over it for days and nights, knowing that the decision meant the expenditure of many dollars for better or worse.

The task of solving this question was brought before me not long ago, concerning the State street cable track, which had reached a deplorable condition. Taking the track master with me we rode over the line, and, as street-railroad men often do, guessed that it was time to rebuild the track. This involved a very large expenditure, and it would be an expensive guess unless correct; so to ease my conscience, and make sure of my guess, I had run over the line a car weighing 8,665 pounds, attached behind a grip car by means of a recording spring balance, called a dynamometer. This test car was then run over a track newly made, at the same speed as over the old line; the dynamometer showed that it took 13.75 pounds more pull per ton to haul cars over the old line than over the new. The average speed of cars on this street is 12 miles per hour. The excess horse-power required to haul one ton was .44, and the excess cost of hauling one ton one hour was $0.0088. The number of tons hauled one mile per year on this track was 45,147,537, and the time required to haul one ton one mile was five minutes, and 45,147,537 tons hauled at a given speed for five minutes is equal in work done to 3,762,295 tons hauled at the same speed for one hour; 3,762,295 multiplied by $0.0088 equals $33,108, which is the excess cost per year for hauling cars on account of bad track. It is estimated that the new track with cast joints will last 12 years, and, as there will be no low joints, the draw-bar pull will not increase much until the rail is worn down sufficiently to allow the wheel to run on the flange, so the annual saving will be nearly $33,108 during the life of the rail, and the total saving will be $397,276, which in 12 years will pay principal and interest on $293,444, which is the amount we could profitably expend in repairs. The actual cost of rebuilding this track was $61,670.

DISCUSSION.

Mr. Seely: I move that a vote of thanks be extended to Mr. Bowen for his valuable paper, and that it be printed and spread upon the minutes. Carried.

The President: We would like to hear from other members of the association in regard to track construction, track joints, etc.

Mr. Robert McCulloch: There is one important matter in connection with Mr. Bowen's paper—I do not wish to criticise it, but merely wish to give my own experience—with regard to the carrying of the current over a welded track without bonds. We have one piece of track which is 13 miles long and all welded together, the most of it being 60-foot rail. We have not an ounce of copper nor a bond of any kind on the entire track. We have made tests of all sorts, with delicate instruments, graded to the thousandth part of a volt, tested as long and as short lengths as possible, sometimes a mile and sometimes a single joint, and have found in most instances that the carrying capacity of the joint was greater than that of the rail at any other place. We have found no necessity for bonding; our contact is perfect at the extreme ends of the rail; and I do not believe it is necessary to bond a welded track.

Mr. Scullin: Has the gentleman found any difference in the carrying capacity of the rail, after the weld has been in use some time?

Mr. McCulloch: All the tests we have made have been on track that was laid about 10 months since. The tests were made about two months ago, so that the oldest joints we tested were about six or eight months old.

Mr. T. J. Minary: Were the tracks welded by electricity or cast welding?

Mr. McCulloch: Cast welding.

Mr. Seely: I ask Mr. Bowen whether it is necessary to own a plant for repairing purposes in case the joints are broken? How do you repair joints after the welding plant is taken down? I know that to weld a mile, or four or five miles, it is not expensive to run a cupola; but it would be in the case of repairing a few joints now and then.

Mr. Bowen: For a small road it would be better to let the contractors repair the broken joints. For a large system it would probably be better to keep a cupola; you are always building more or less track, and doing a considerable amount of repair work. A large system is generally building new track, and you could use a machine and make it pay for itself.

Mr. Dodge, of New Haven: You spoke of something like 200 joints, out of 1,700, which parted; how soon after the casting of these joints did they part; was it very soon after they were welded?

Mr. Bowen: We lost the joints on account of contraction, due to very cold weather, in mid-Winter. With the first cold snap the contraction of the rails pulled 154 joints apart. The joints were then repaired, and

since then they have gone through the Summer the same as the other joints.

Mr. Dodge: Were they cast in the Winter; were they made in the Winter?

Mr. Bowen: No, sir; in mid-Summer, during the night hours.

Mr. Scullin: I ask Mr. Bowen if most of the joints were examined, or simply those found broken? I want to ascertain if the joints were not loosened as well as broken—some of them loosened in some way or other, and which was not perceptible until they were closely examined.

Mr. Bowen: There were 154 remade. When they do part, it is for two or three inches, so that you can see them readily. If there is any oxidation between the joint and the rail, I hardly imagine it would do any harm, unless it was sufficient to loosen the cast-iron from the rail proper. In that case it would come apart three inches, due to the contraction of four or five blocks of steel.

Mr. H. H. Littell: What kind of a job do you make in repairing a rail with a space of three inches?

Mr. Bowen: We saw a piece of rail and cut it in, and recast around the entire two joints in that case.

Mr. Connette: I ask what the average cost of the joint is?

Mr. Bowen: It is about what the contractor can get out of it—I do not know whether it is a trade secret or not. The joint requires 100 pounds of cast-iron, so that you can make your own calculations.

Mr. Wyman: As it is possible that some other gentlemen here may be as interested in the answer to the question I am about to propound as I am—and for that reason I ask it here, instead of asking it of Mr. Bowen after the meeting—I venture to take the time of the meeting to ask it. Mr. Bowen says that he uses the bond in order to be absolutely certain of obtaining conductivity in the rail. Will he kindly tell me how he uses it? Do you use it around the weld or beneath the weld?

Mr. Bowen: We simply bond the track after we cast the joints.

Mr. Wyman: You use a long bond around the weld?

Mr. Bowen: Yes, sir.

Mr. Wyman: You said just now that when one of those welded joints pulled apart, as they do naturally, they would pull apart two or three inches.

Mr. Bowen: Yes, sir.

Mr. Wyman: Do you allow for that in your bond?

Mr. Bowen: When the joint pulls apart, in all probability it ruptures the bond. If it does, we put in a new bond. I am not sure that the practice will obtain after the next year or two to come.

Mr. Goff: May I ask what trouble you have in the Summer time? I have in mind a track which I think was bonded in the Winter—cast in the Winter—and in the Summer time it seems to be out of line all the time. The car has a waving motion over the track. Do you have any trouble of that nature?

Mr. Bowen: That comes from the casting. Mr. Littlefield, of the Johnson company, told me that the rails usually delivered to consumers are not sawed square on the ends, but are sawed with the ball on the bias; in other words, that the ball of the rail comes together and the flange of the rail does not. I have noticed that in laying rails. You will find, as you put your mold on to cast the joint, that the rails have contact at the ball and not at the flange at all. If you are not careful, the rail will do two things—it will go out and it will go up, on account of the majority of the iron being underneath the rail. The contraction, in cooling, will push it up and push it out. In order to prevent that, we put a clamp on the rail when casting it, and push it in a quarter of an inch and down a quarter of an inch.

Mr. Goff: Did you have this trouble before you cast the track in the manner you just mentioned?

Mr. Bowen: We cast straight joints now; we used to cast crooked ones.

Mr. Goff: What temperature do you find gives the best results? Do you take the season of the year when the temperature is cool, or can you do it equally well in the Summer or late in the Fall?

Mr. Bowen: I should advise the majority of joints to be cast at night, so that the temperature will be cooler. I advise a medium temperature, a little cooler than the medium temperature for your climate, whatever it is. We like to cast at a temperature of between 40 and 50; somewhere about 50 degrees.

Mr. A. Langstaff Johnston: In the examination of the broken joints by contraction, did you find that the rail pulled out of the cast-iron?

Mr. Bowen: Occasionally, but more often on account of our driving two pins through the last two holes of the fish-plate. We have supplemented the joint with them. We find then that it tears the casting apart.

Mr. Johnston: Then the cast metal is in the mass, but still it is not a homogeneous mass?

Mr. Bowen: It is not in spots. There is a spot on each side, which shows amalgamation.

Mr. Johnston: That is something important, because if there are no spots where it is amalgamated to the steel rail, you would not have a good electrical connection.

Mr. Bowen: I have cut off many joints, and I have found some places where the amalgamation has taken place, and some where it had not.

Mr. Johnston: Have you allowed a time test as to the amalgamated metal carrying the return current through the joints?

Mr. Bowen: In welding your rails you would have to be careful to clean the rails or you would not get a good electrical connection.

Mr. Lang: What is the lightest weight of girder rail you have used in making these cast-welded joints, and have any of those rails been placed on chairs?

Mr. Bowen: The 63-pound rail was the lightest we have used, four and one-half inches high, which we used on chairs. That is the lightest rail. The heaviest rail is a seven-inch, 83-pound rail. We have used no chairs on the nine-inch construction.

Mr. Lang: What kind of chairs did you use on the rails you speak of?

Mr. Bowen: Steel chairs. In the nine-inch construction we use in our electrical work malleable iron chairs, but this happened to be a steel chair that was used.

Mr. Hubbard: In regard to the bonding—the kind of bond you used with the cast-welded joint—you spoke of some joints that did not make a complete bond in casting.

Mr. Bowen: You want to know the kind of bond?

Mr. Hubbard: Yes, sir.

Mr. Bowen: We used a bond made by another company and afterwards changed to a bond made by the Roebling company.

Mr. H. H. Littell: What was the name of the bond used?

Mr. Bowen: That made by the Roebling company was the Columbia, which we now use.

Mr. Littell: Do you use the single bond or double bond?

Mr. Bowen: It depends, of course, on the proximity of the power station, and how many cars are on the line.

Mr. Littell: What size wire?

Mr. Bowen: 0000.

Mr. Littell: Not cast in?

Mr. Bowen: No, sir; around the outside of the cast-welded joint.

Mr. Harrington: Do you observe any particular proportion in the metal used in making up the casting?

Mr. Bowen: Yes, sir; I gave it in the paper.

Mr. Harrington: Is that proportion observed throughout?

Mr. Bowen: Yes, sir.

Mr. Bean: I would ask if Mr. Bowen has bonded any T rails?

Mr. Bowen: No, sir.

Mr. Dodge: I will say that in New Haven, Ct., there are about 1,500 joints there which have been cast on 50 and 60-pound T rail. Some one inquired about the cost of these joints. I understand that the man who is putting them in at New Haven on the 50 and 60-pound T rail is getting $3.25 a joint; the railroad company having to pay the freight to and fro on the apparatus necessary.

Mr. H. H. Littell: I ask Mr. Bowen, or any gentleman present, if they have had any trouble or experience with the pulling apart of the rail, pulling the rail in two, not at the joint, whether welded joint or put together with splice bars, pulling the rail in two by the contraction?

Mr. Bowen: I think that there were one or two cases on our road of pulling apart. Instead of the fracture being just at the joint, it was some little distance back, probably where the difference between the extreme heat and the ordinary temperature of the rail left a partial fracture; there were only one or two cases.

Mr. Littell: If the members of the convention will give me the time, I am going to tell a little story—I do not ask you to believe it, but it is a fact—

Mr. Bean: Tell the truth, you mean—

Mr. Littell: I always do, Mr. Bean. We have no welded joints in Buffalo. We have the ordinary track laid with nine-inch rail, 94 pounds to the yard. Summer before last we put down some nine-inch rail in hot weather, forcing the rails just as close as we could, leaving them uncovered until the morning. In the morning we drove the rail back—a lot of men with a heavy timber—and drove the rails up as close as we could, and put them together with a 12-bolt splice bar, one-inch bolt. We got along very nicely for a time, but Winter before last we had one of the rails pull in two, 13 feet from the joint; a 32-foot rail, nine inches, weighing 94 pounds to the yard.

Mr. Seely: We have had some experience in that line, 90-pound girder rails pulling in two, on an elevation, grade of about five per cent. We have this occur every Winter; the rails break right in the center. The joints are driven too close together, and the rails are bound to expand in some direction. We also find that, with the high-carbon rails we are using, it is almost impossible to cut them with the ordinary tools; we require special devices for sawing rails in two. In sawing rails, if you have to turn them over, they will crack all the way down the center, and we are compelled to handle them with the greatest of care.

Mr. Scull: What does the indicator card cost?

Mr. Bowen: I have no idea; it was built in our shops. The cost is a nominal sum outside of the framing of the car. It is a few wheels and strings. There is no patent on it, and I will be glad to furnish anybody with the details if they apply for them, or lend them the car.

Mr. Dodge: In the cases where you mentioned the rail as being forced up, breaking your joint, did you break that in pieces and make a new joint?

Mr. Bowen: That was not the fault of the casting, and we corrected those cases and have only a few left; pushing them down and recasting. It is faulty work.

Mr. Dodge: This foreign concern which is doing this work in New Haven, they follow this plan; when it is thrown up in that way—and I saw quite a number—they start back two or three feet and grind it down with an emery iron across that joint.

Mr. Bowen: We do not do that. We file down, but merely for the purpose of getting the proportions of two rails alike, when they are of different heights, or something of that sort. We won't allow a joint to be cast and leave it high now. It is necessary with every joint to smooth it off, and we are careful to smooth it off so that it has a perfect surface. You can not tell it from any other part of the rail. We do this because a joint which once begins to pound is half worn out.

Mr. Harrington: Are you doing this work yourself?

Mr. Bowen: I am doing this work myself.

Mr. McCormack: In answer to Mr. Littell's inquiry about the experience with cast-welded joints, our company, in Brooklyn, put in 2,000 cast-welded joints on the 94-pound rail, nine-inch girder, and out of that number there was only one which pulled the rail apart; the rail broke about four inches from the end. They have given us very good satisfaction—at least we think so. We had some on our old six-inch rail that broke, but we thought that was due to the kind of rail.

Mr. Heft: I would ask Mr. Dodge if he would recommend this cast-welded joint from his knowledge of it in New Haven?

Mr. Dodge: I stated before, when speaking about it, that it was not done on our road; it was on another road in our city. I have had no personal experience in relation to it; I am simply telling about it.

Mr. Heft: You have not followed the matter up?

Mr. Dodge: No, sir.

Mr. Scull: Are you paying the Falk company a royalty?

Mr. Bowen: Yes; we have 32,000 joints in, and pay so much royalty for each joint.

Mr. Littell: On the street that this particular rail parted in two we have four curves. At two points on this street the special work pulled apart at the curve, and in one instance the joint of the rail only separated; the rail pulled apart at the joint. On examining this joint we found that the trackmen had slighted it. They had relaid the track, and when they connected up that joint they put in some small bolts so as to connect it up, and when they put in the new rail they left in some three-quarter-inch bolts instead of using inch bolts. It could not be drawn up tight.

Mr. Davis: Do you have any trouble in the application of the cast joint in connecting special work with the girder?

Mr. Bowen: If we have a track switch or something of that sort, we have special molds made for those cases; but we do not make the special work with the cast-welded joint. I think the Johnson company and the Wharton company make such work, and others where they cast the joint in that work.

ADVANCE INFORMATION

Valuable News and Tips for Manufacturers and Dealers.

We publish below information relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW.

New Manufacturing Companies.

BROOKLYN, N. Y.—Batchelor Electric Company has been incorporated by Joseph F. Batchelor, Chas. J. Pearson, Herbert G. Anderson and Geo. A. Stearns. Capital stock, $100,000.

NEW YORK, N. Y.—The West Side Electric Company has been incorporated; capital stock, $25,000. Directors, William A. Mitchell, Egbert C. Simonson and Charles V. E. Gallup.

WHEELING, W. VA.—The Wheeling Private Electric Corporation has been incorporated by H. S. Sands, H. E. Hohman, T. H. P. Keyser and R. W. Kyle. Capital stock, $25,000.

New Telephone and Telegraph Companies.

YOUNGSTOWN, OHIO—The Central Union Telephone Company has begun a series of improvements all along their lines in this city, that means an outlay of $30,000 or $40,000. The company proposes to cable all its lines along West Federal street from the Diamond to Holmes street; also along Wick avenue, Bryson and Elm streets to Madison avenue.

COMSTOCKS, N. Y.—Articles of incorporation of the Comstocks Telephone Company have been filed. It is proposed to connect Truthville, North Granville, Comstocks and West Granville by telephone. The capital stock is $500.

PENN YAN, N. Y.—A new telephone line is being constructed between this place and Watkins. It is to be a copper line, and will be used chiefly for long-distance telephoning.

ASHLAND, ME.—The Ashland Telephone Company has been incorporated for the purpose of carrying on the business of transmission of intelligence by electricity in Aroostook County, with $10,000 capital stock. The officers are: President, Joshua B. Bartlett, of Ashland; treasurer, Lindley Dobson, of Ashland.

Increase of Capital.

ROCKLAND, MASS.—The Hingham Street Railway Company has petitioned the railroad commissioners for authority to increase its capital stock to $160,000, and for approval of the issue of bonds to the total amount of $140,000.

Electric Light and Power.

NEWTON, N. J.—Newton Electric Light, Heat and Power Company has been incorporated by Julius A. Skelton, Harry Skelton, Andrew Van Blarcom and John Huston. Capital stock, $25,000.

PITTSBURGH, PA.—Electric Gas Light, Heat and Power Company has been incorporated by Henry Hubbard, John McCarvey, C. D. Williams and Ralph Theophilus. Capital stock, $50,000.

BEAVER FALLS, PA.—Valley Power and Light Company has been incorporated by W. A. McCool, Henry W. Reeves, Hunter Eckert, A. S. Reeves and J. M. Kreamer.

CHICAGO, ILL.—Radiating Light Company has been incorporated by Henry Schofield, Henry M. Bacon and William R. Odell. Capital stock, $10,000.

RAPID CITY, S. D.—Consolidated Gas and Electric Company has been incorporated by L. L. C. Brooks, F. M. Catlin, St. Paul, Minn.; Wm. Kennedy, Des Moines, Iowa; Dennis B. Ryan, Jersey City, and E. Arden Noblett. Capital stock, $200,000.

SANTA MARIA, CAL.—There is a probability that this place will be lighted by electricity.

MARIETTE, MICH.—A special election will be held to settle the question of this village for $4,000 for an electric light plant.

ATHICA, OHIO—It is reported that an electric light plant is to be established here.

CAMDEN, N. J.—The New York Lighting Company has been incorporated with a capital stock of $10,000. The objects of the corporation are to supply light, heat and power.

HARRISBURG, PA.—The charter has been granted to the Beacon Electric Light Company. J. George Kaelber, Albert Will, George C. Hetzel, I. Engle Cochran and H. B. Black, directors.

ST. PAUL, MINN.—The ordinance granting Brook's Brothers a franchise to construct and operate an electric light and power plant in the 10th and 11th wards has been passed.

LITTLE ROCK, ARK.—The Little Rock Tobacco Company has been granted permission to erect an electric light plant.

BRISTOL, VA.—C. C. Cochran applied to council for a franchise for an electric light and power plant.

BOYERTOWN, PA.—The Boyertown Light, Heat and Power Company will erect an electric light plant.

NEW BRIGHTON, N. Y.—The Thomas syndicate, which was recently organized to establish an electric light plant, have completed arrangements for supplying patrons in the village of Fort Richmond, where the company has been given a franchise for commercial lighting.

ROCKFORD, ILL.—The new electric light plant is being put in at the Kane County almshouse.

WASHINGTON, D. C.—The United States Electric Lighting Company will expend about $1,000,000 in improving its plant.

BARNESVILLE, GA.—The Fort Wayne Electric Corporation, of Fort Wayne, Ind., will commence the erection of the city's electric light plant.

TERRELL, TEX.—The Terrell Electric Light and Power Company will enlarge its plant, and will also erect a plant at Kaufman, Tex.

QUINCY, MICH.—Rhenbottom & Bond, of Union City, Mich., have been granted a 15-year franchise for a complete central station electric lighting plant.

DEMOPOLIS, ALA.—J. G. Chisolm, clerk, concerning erection of new electric lighting plant to cost about $5,000.

New Electric Railways.

DERBY, CT.—The Derby & New Haven Electric Railroad Company has brought suit in the Superior Court at New Haven, to have the court determine whether an electric road is needed from Derby to New Haven.

RUTLAND, VT.—Springfield Electric Railroad; work delayed for lack of funds; $150,000 is necessary to build and equip the road, of which $30,000 have been subscribed.

THOMPSONVILLE, CT.—A meeting was held recently to consider certain changes in the layout of the electric road, against which numerous complaints have been made.

MANCHESTER, N. H.—The Pine Grove trolley extension matter laid over for a week.

HARTFORD, CT.—The Consolidated Railroad has made extensive improvements at Bridgeport and Stamford.

BANGOR, ME.—Hon. I. C. Libby, of Waterville, and A. F. Gerald contemplate the construction an equipment of an electric road.

BROCKTON, MASS.—An electric road will probably be constructed to East Bridgewater.

BURLINGTON, VT.—The Burlington & Grand Isle Railroad Company; incorporated by Warren Corbin and M. Hibbard, of Grand Isle; G. W. Squires and others. Capital stock, $200,000.

MEDWAY, MASS.—The Milford, Holliston & Framingham Street Railway Company have been granted an electric street railway franchise.

NEEDHAM, MASS.—An electric road is in contemplation.

SEDALIA, MO.—Edward Wood, of Chicago, backed by New York and Boston capitalists, proposes to construct an electric line from Monett, Lawrence County, Mo., to this city.

HAVERHILL, MASS.—The new branch of the L. L. and H. electric road from Bradford to Ward Hill is being constructed.

CLEVELAND, OHIO—The boards of directors of the Cleveland & Berea and Cleveland & Elyria electric railway companies have consolidated. The company is now known as the Cleveland, Berea & Elyria Electric Railway Company.

GEORGETOWN, D. C.—The arrangements are being made for the formation of a company which will have control of the proposed electric road from this place to Ipswich. The company will be composed of parties who have an interest in the H., G. & D. road, and other street railway men. A meeting of those interested in the company will be held this week.

OLEAN, N. Y.—An electric road is to be built between this place and Bradford at an estimated cost of $100,000.

OWOSSO, MICH.—The consolidation of the Owosso & Corunna Traction Company's plant and that of the Owosso Electric Company has been completed. The companies are now conducted by J. A. H. Ralph, president of the traction company.

CORTLAND, N. Y.—The Cortland & Homer Traction Company has petitioned the Village Board of Trustees for a franchise on Elm street from its intersection with Church street to Pendleton street, this making a direct line to the Tioughuioga down Elm street.

FERGUSON, MO.—Preparations will be made this Fall for extending the Scullin system of street railway to this place.

BEVERLY, MASS.—The Board of Aldermen of this place have voted to grant the Lynn & Boston Railroad permission to equip the Cove branch with electricity.

MALDEN, MASS.—The Lynn & Boston Street Railway Company has been granted permission to build an electric line on Florence street, the work to be completed by December 1.

NEWTON CENTER, MASS.—The West Roxbury & Newton Street Railway Company has been incorporated by W. M. Mick, H. B. Cook, F. C. Hinds and F. E. Sweet, to build a street railway from Boston to Newton. Capital stock, $200,000.

QUEBEC, QUE.—P. B. Dumoulin, J. J. T. Fremont and Andrew Thompson are interested in a new electric street railway company which is being organized.

SANTA MONICA, CAL.—The Pasadena & Pacific Railway Company has been granted franchise to construct an electric street railway.

NEW ORLEANS, LA.—The New Orleans Traction Company, of which R. M. Walmsley is president, will erect an electric power plant, to cost between $400,000 and $500,000.

RICHMOND, VA.—The Lee District Street Railroad Company has been organized to build an electric line in what is known as the Lee District of the city. An application for a franchise has been made to the City Council.

No Doubt Will Sue the Trolley.

[*From the Bangor News.*]

A Bath woman who banked in her stocking broke a garter and lost $56 in her efforts to catch a street car.

The city of St. Louis, Mo., is now withholding from the Edison Illuminating Company the sum of $25,000 for failure to properly execute its contract for lighting the southern district of this city.

Kindred.... ...Interests

The Mitchell Tempered Copper Company, of Corry, Pa., has lately organized and fitted up complete works for the casting of pure copper. They use only the Calumet-Hecla ingot copper and make strong claims for purity, solidity and durability. They make a specialty of commutator bars and segments, which are of even temper and gauged to the one thousandth part of an inch. They also do heavy or light copper castings.

The Berlin Iron Bridge Company, of East Berlin, Ct., have a contract for a car barn and shop building for an electric road at Port au Prince, Hayti. These buildings will be of steel throughout, having a steel skeleton framework covered on the sides and roof with corrugated iron. The shop is 33 feet by 70 feet, and the car barn, 40 feet by 160 feet. This building is only one of many which have been gotten out by this same company for export to foreign countries during the past few months.

The Standard Underground Cable Company, of Pittsburgh, Pa., has recently secured several handsome contracts for underground electric light and telegraph cables in the vicinity of Chicago; notably, rubber-insulated, arc lighting and telegraph cable for the city of Chicago, and a large order for duplex rubber insulated underground cable for the West Chicago Park Commission. The same company has recently furnished the Detroit Edison company with a large amount of rubber-insulated, lead-covered feeder cable for underground work in Detroit.

WANTED

To know the address of the Mason-Maxwell Telephone Manufacturing Company, formerly of Richmond, Va.

Address E. M. P.,
Care ELECTRICAL REVIEW,
Times Building, New York.

WANTED.

An all-round instrument maker of experience can secure employment by addressing

C. W. P.,
Care ELECTRICAL REVIEW,
Times Building, New York.

WHITE-CROSBY COMPANY,
CONTRACTING ENGINEERS,
EQUITABLE BUILDING, BALTIMORE, MD.
New York Office, 29 Broadway.

STYLE "H" BELL.
PIVOTED ARMATURE.
DOUBLE ADJUSTMENT.
RELIABLE RINGER
Send for New Catalogue.
HUEBEL & MANGER,
MANUFACTURERS,
286-90 Graham St., BROOKLYN, N. Y.

Fluorescent Screen for Roentgen Rays.

R. W. Buttemer gives the following instructions for making a fluorescent screen: Brush over a piece of black card with gum, and sift the salt over it. I have used this method with calcium tungstate (scheelite); but this salt, though brilliant, phosphoresces as well as fluoresces, thus giving a foggy image after a few consecutive trials. Or mix the powdered salt with collodion (flexible, *i. e.*, containing a percentage of castor oil), and coat the card or aluminum foil with it. I have found this method most successful with barium platinocyanide on aluminum foil. Or coat the card or foil with dilute flexible collodion, and sift the salt over it. I have used this method with Melckebeke and Van Heurck's fluorescent salt, which appears to be an organic salt of uranium. But in all cases success depends on finely powdering and sifting the (carefully dried, if necessary) salt. I use 120 to the inch.—*Photography.*

The Edison Electric Illuminating Company of Brooklyn, N. Y., September statement shows:

	1896	1895	1894
Gross,	$63,551	$57,453	$37,541
Net,	26,796	26,825	15,053
9 mos net,	219,056	147,858	295,717

TELEPHONE SERVICE IN NEW YORK IS

EFFICIENT All subscribers have Long Distance Telephones and Metallic Circuit Lines—the best equipment known to the Telephonic Art.

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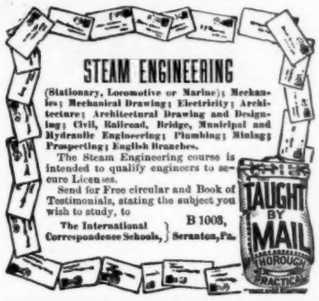
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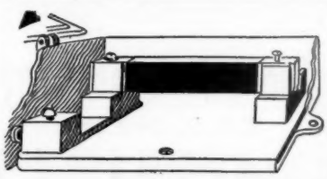

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[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED OCTOBER 20, 1896.

569,818 Electric arc lamp; H. P. Davis, Pittsburgh, Pa.

569,824 Brush holder for dynamos; W. M. Hand, St. Louis, Mo.

569,824 A block having a socket, and a carbon having a neck fitting in the socket, and held therein by solder.

569,827 Single-wire electric railway; J. C. Henry, Westfield, N. J.—Two tracks and a single working conductor common to both, a zigzag feed and span wire, insulators supported by said feed and span wire having hangers to support the working conductor, and branch wires connecting said conductor with the feed and span wire.

569,836 Electrically welded pipe joint; A. H. Matatall, Harrison, N. J.

569,851 Thermostatic fire alarm; H. Baer, New York, N. Y.

569,861 Circuit closer for burglar alarms; C. H. Dowden, Newark, N. J.

569,866 Electric motor; W. E. Freeman, Long Island City, N. Y.—A cylindrical shell constructed of two sections, with a concentrical cylindrical field magnet on the interior of the head of each of the sections, said field magnet constructed in outline eccentric to the line of the exterior of the armature.

569,881 Electric arc lamp; J. E. Morris, Chester, Pa.

569,882 Lock with electric safety attachment; A. J. Moulart, Paris, France.

569,889 Trolley for electric railways; H. A. Seymour, Washington, D. C.—A trolley pole and a trolley-wheel holder at the upper end of said pole, an electro-magnetic device connected with said holder and constructed to force the trolley wheel against the conductor.

569,908 Telephone transmitter; H. C. Alexander, Bonham, Texas.—A vibratory carbon button, a flaring spring-supported carbon cell having a filling of granulated carbon.

569,911 Electrical muffle or heater; L. E. Custer, Dayton, Ohio.

569,931 Socket and switch for incandescent lamps; J. M. Moffat, London, Eng.

569,933 569,934 Combined electric hydraulic elevator; J. Parkinson, Los Angeles, Cal.

ISSUED OCTOBER 27, 1896.

569,989 Electric motor regulator; W. A. Anthony, Newark, N. J.—A multipolar motor, and means for varying the strength of any pair or pairs of field-magnet poles.

570,009 Rheostat; A. C. Dinkey, Munhall, Pa.—A rheostat having a single set of resistances provided with a single set of contact plates, and a separate arc-shaped contact plate, an arm arranged to move over said plates in either direction, and means for reversing the current through the resistance when the direction of movement of said arm is reversed.

570,013 Galvanic battery; R. W Gordon, New York, N. Y.

570,019 Wattmeter; G. Hummel, Munich, Germany.

570,028 End electrode for electric power storage batteries; J. Langelaan, Cologne, Germany—Electric storage batteries having positive and negative plates provided with active material, alternately arranged therein, and end plates having openings therein, and the plates intermediate the end section having unbroken surfaces.

570,034 Insulator; C. B. Martin, Schenectady, N. Y.—A body of insulating material, a support therefor, a metal clamp for gripping the rail, adapted to be slid upon the insulator when assembled, and means preventing the clamp from lifting.

570,046 Electric signal for street-car crossings; C. A. Parrish, Jackson, Mich.

570,053 Electric arc lamp; G. C. Pyle, Indianapolis, Ind.—A gravity-fed upper electrode, a lower electrode, telescoping springs to support said electrode and feed it upward, and a solenoid to regulate the arc.

570,068 Electric switch; S. A. Stewart, Waltham, Mass.

570,072 Telautograph; G. S. Tiffany Highland Park, Ill.

570,077 Electric heater; E. P. Wetmore, St. Joseph, Mo.—Consists of the combination of an electric converter, having hollow secondary conductors therein, and means for electrically closing each or all upon themselves, said means being provided with circuit-closers for opening and closing the primary conductor of the said converter.

570,078 Trolley for electric railways; W. M. Whiting, East Orange, N. J.

570,089 Safety apparatus for railway crossings; G. Gibbs, Milwaukee, Wis.

570,112 Telautograph; G. S. Tiffany, Highland Park, Ill.—A receiving instrument comprising a friction clutch for transmitting power from the motor shaft to the receiving pen, and a magnet for controlling the position of said friction clutch to determine the direction of motion transmitted in accordance with the movement of the transmitting pen; the parts of the clutch being in each of its positions held in contact by spring pressure.

570,118 System of distribution for alternating currents; C. S. Bradley, Avon, N. Y.—Comprises a triphase generator having two generating coils or groups of coils 120 degrees apart and connected with three line wires, triphase motors supplied from said line wires, and a single-phase lighting circuit inductively related through a transformer to both current phases.

570,119 Electric car motor; C. S. Bradley, Avon, N. Y.—A wheel and axle provided with an electric motor mounted upon a sleeve surrounding the axle, said sleeve being supported by the car wheels upon tangentially arranged springs.

570,125 Apparatus for producing wire bars by electrode position; J. B. Forsyth, Boston, Mass.

TREASURY DEPARTMENT, WASHINGTON, D. C., October 9, 1896.—Sealed proposals will be received at this department until 2 o'clock P. M., November 9, 1896, for installing an electric light and power plant in the Court House and Post Office Building, New York city. Proposals will be received as follows: 1st. For wiring the building. 2d. For dynamos and engines. 3d. For boilers and connections. 4th. For the plant complete, and, 5th. For the removal and purchase of eight boilers now in the building. Proposals must be accompanied by a certified check, drawn to the order of the Treasurer, U. S., in the sum of $1,000, as a guarantee of good faith. The right to reject any and all bids, and to waive defective bids, is reserved by the department. Specifications and plans can be obtained upon application to this department. Proposals should be addressed to the Secretary of the Treasury, Washington, D. C., and indorsed: "Electric Plant, Court House and Post Office, New York city." W. E. Curtis, acting secretary

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REFERENCES: "Electrical Review," New York; Paul Cromlein, Teller Lincoln National Bank, Washington, D. C.; Judge Geo. D. Parker, Berkley, Va.; Second National Bank, Washington, D. C.; E. K. Leech, U. S. Mint, Philadelphia, Pa.; W. F. Newell, Manager and Secretary Water Works, Olympia, Oregon.
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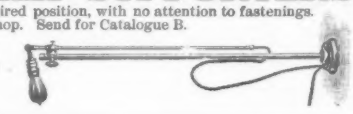

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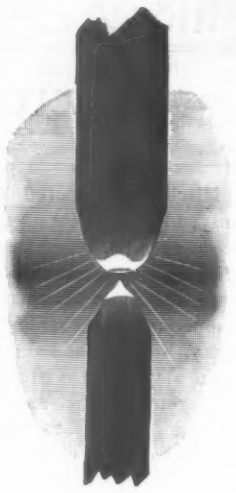
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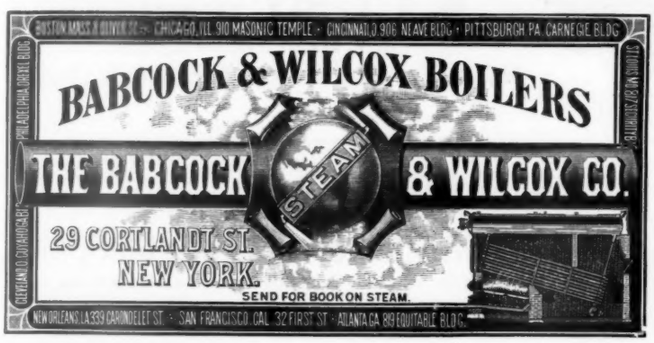
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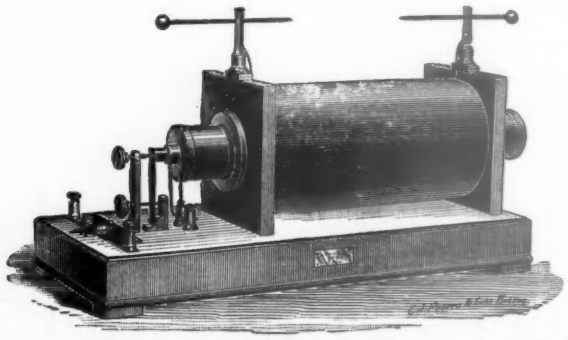

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